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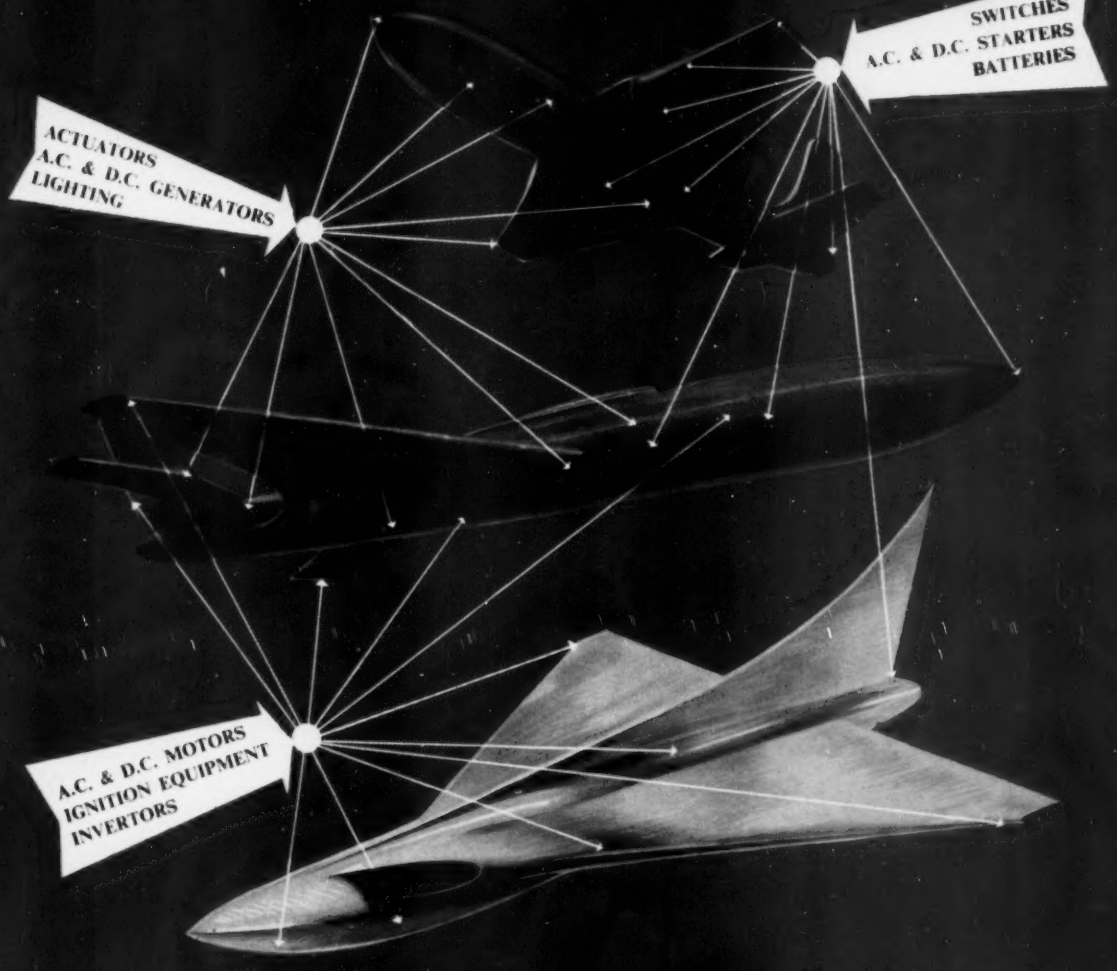

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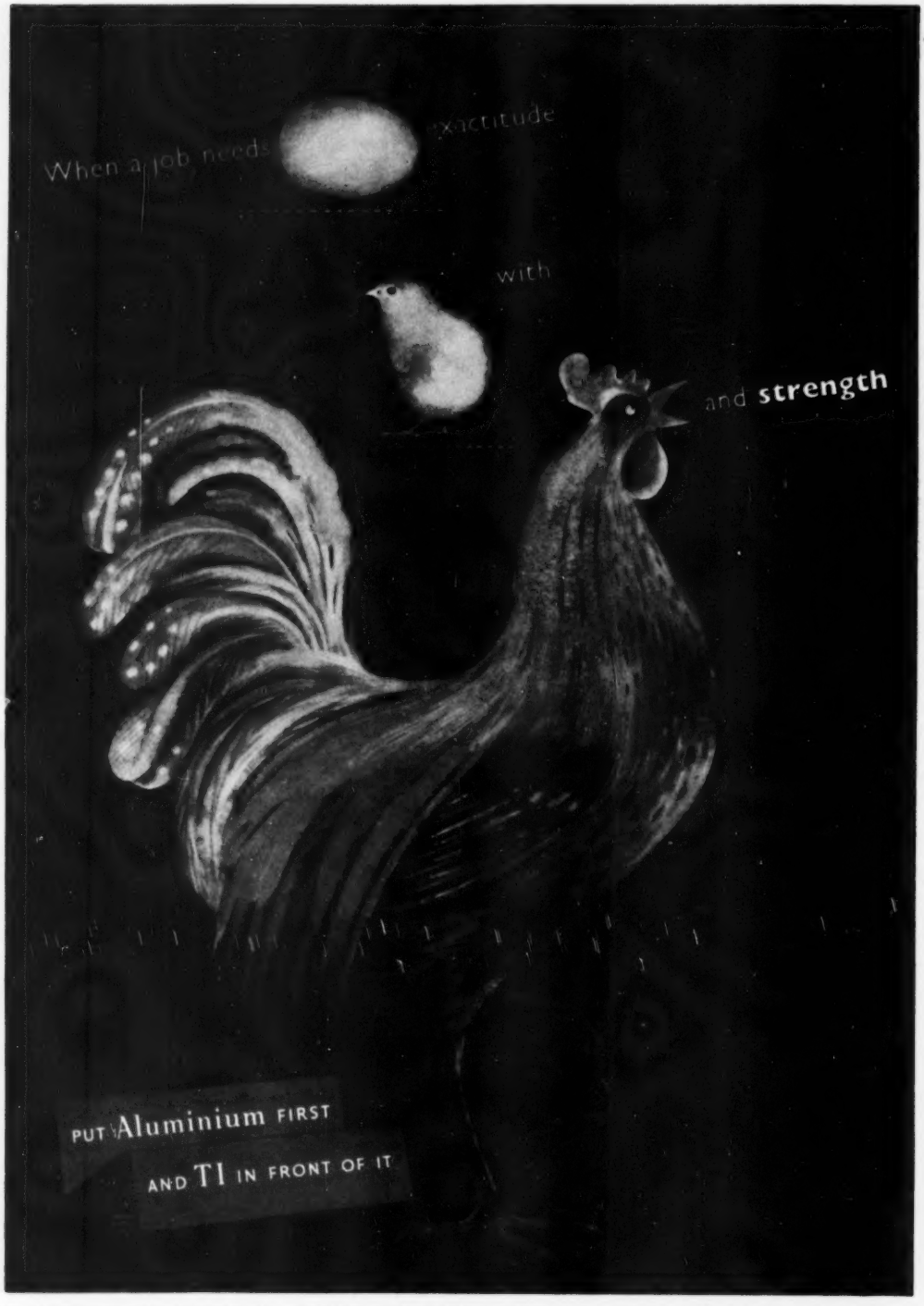

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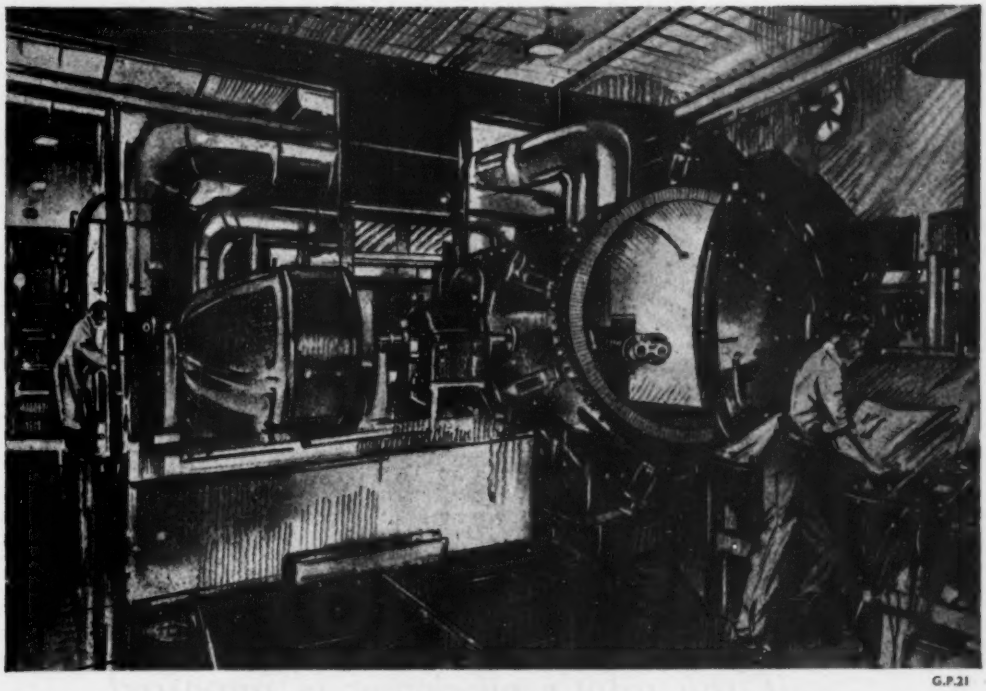

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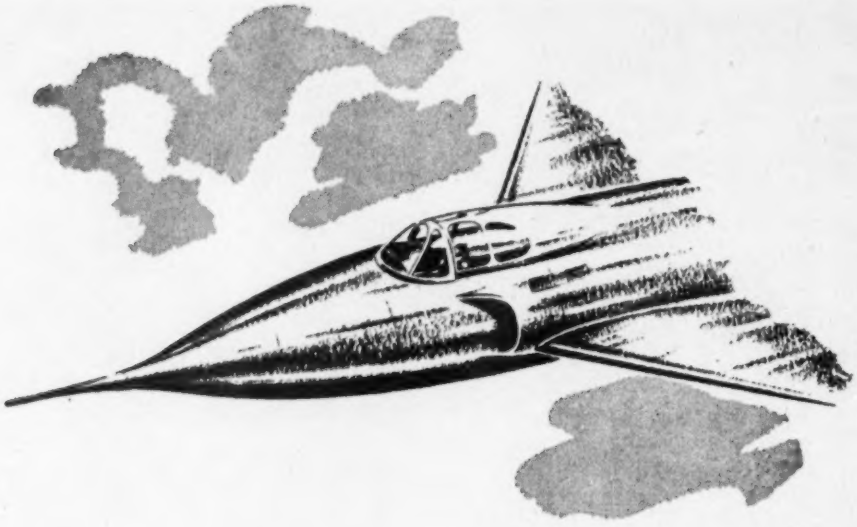

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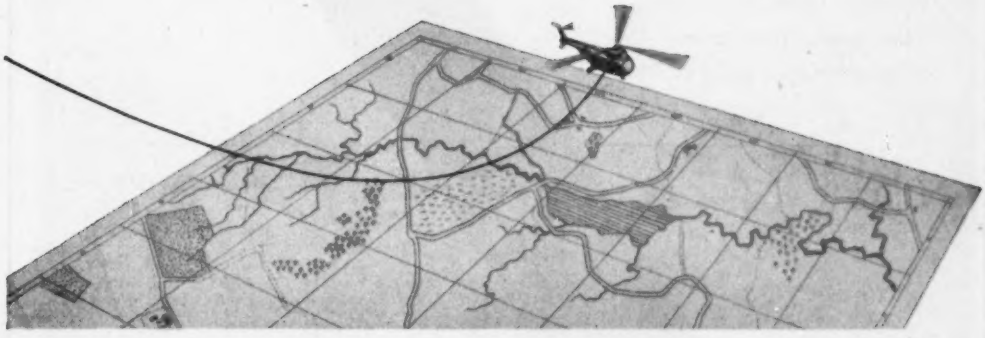

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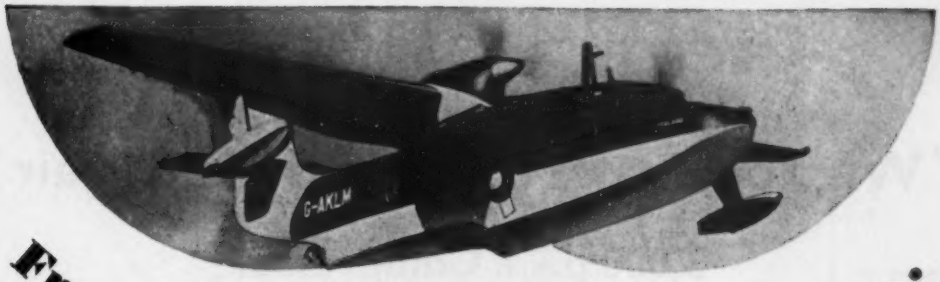
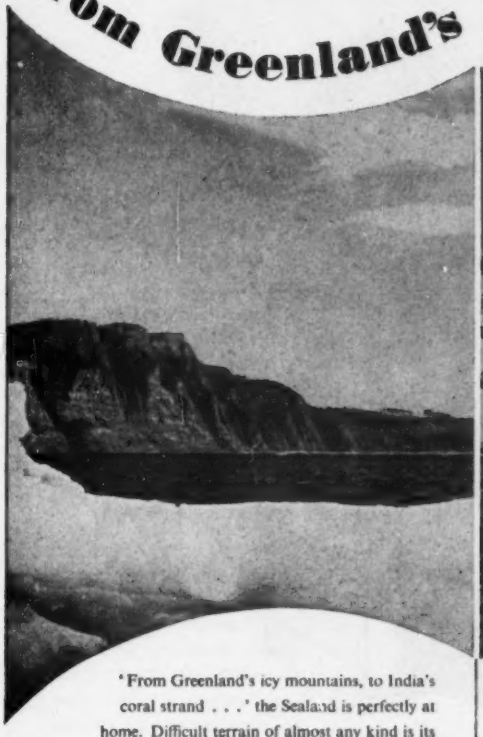
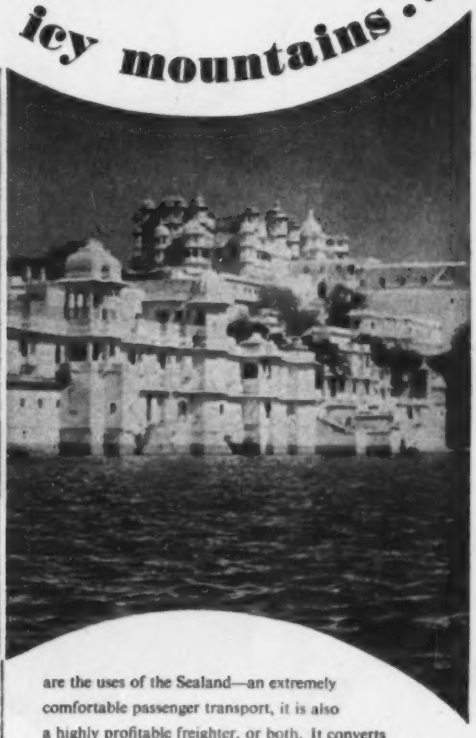


From Greenland's icy mountains . . .





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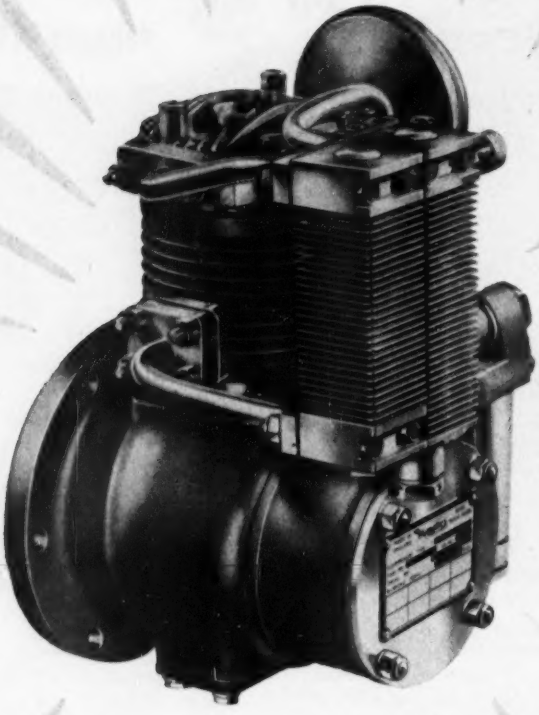

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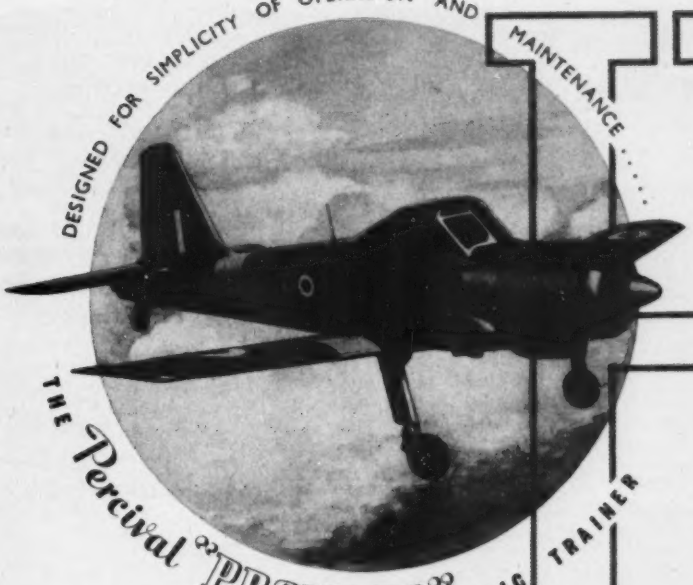

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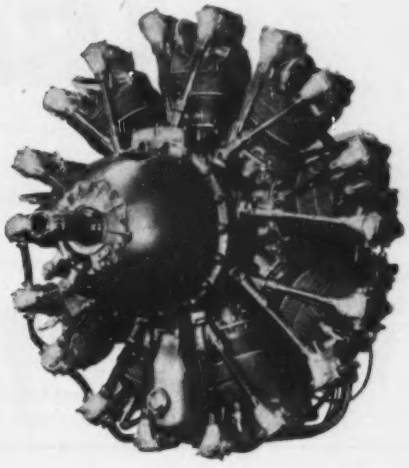

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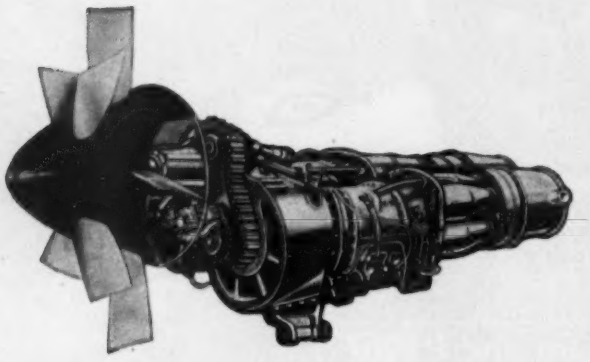

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IN THIS ISSUE:

Sabres - - - - - - - 200
Passenger Round the World - - - - - 206
Helicopter Assault - - 209
Ice-island Airstrips? - - 210
Bulldog, Gauntlet, Meteor 8 211
The Flying-boat's Martyrdom 215
A Light Diesel - - - - 220
Power Steering for Aircraft 221

A New Edge on the Blade

DURING the last twelve months the North American F-86, or Sabre, has been generally recognized as the best fighter at present in service with the Allied Air Forces. That is not to say it is perfect—in fact, there are those in high places who have spoken adversely about certain of its qualities in comparison with the Russian Mig, the types having frequently matched their paces over Korea; but it is in large-scale production and use, has a long development-background through a series of airframe marks and power units, and has emerged a sound and formidable fighting machine.

From time to time the question of procuring Sabres for the R.A.F. has been discussed—usually when those in authority here have had to face the unpalatable fact (which some of them recognize only too well) that the R.A.F. has no fighter in service today which can match the performance of its latest American or Russian counterparts. *Flight's* pen wore a deep groove over a period of years in lamenting that no order had been placed for a single type of swept-wing fighter. Certainly, such types are now on order, and a year or two should see a few in service; meanwhile an alarming gap persists in our defences.

We are mightily relieved that arrangements have been settled whereby Sabres (probably F-86Es to start with) will be supplied from Canadian factories to R.A.F.-manned squadrons. Let us make no mistake: if a fighter has inadequate speed performance a profusion of other good qualities will not prevent its pilot being at a disadvantage in combat. In case thoughts might run to the converse, it may be added that the Sabre has many of the other good qualities in addition to high speed, although possibly its best operational height band for fighter *v.* fighter engagements ends rather low.

The whole arrangement regarding the provision of Canadian Sabres for R.A.F. pilots (as well as a large order for American squadrons), in addition to its satisfactory outcome from the viewpoint of our fighter defences, is a further confirmation of the excellent understanding and co-operation between this country, America and Canada.

A Place for the Flying-boat

IT is with pleasure that we again align ourselves on the side of the flying-boat. In the past *Flight* has more than once been referred to as "that flying-boat paper", and we are proud of it. There are definite indications that commercial aviation will, in a few years' time, again discover that there is an important, even vital, place for the water-based airliner. Sir Frederick Bowhill, in his tenth Brancker Memorial lecture (see pages 215-217), may not have brought many new facts to light, but in our opinion he has marshalled them to form a case, both convincing and up-to-the-minute, "to stop going full speed ahead to kill the flying-boat," as he put it.

Sir Frederick touched on a diversity of aspects, several of which we believe merit very careful consideration. There is the fear that expert flying-boat design-teams in the British aircraft industry are fast being dispersed, and the art lost; there is the trend towards larger transports for trunk routes—and it is, of course, in the large sizes that the flying-boat shows its most marked advantages over the landplane; and there is the almost prohibitive effort and cost now entailed in obtaining the land and constructing and maintaining the vast areas of concrete comprising a modern airport. Other factors not to be passed over lightly are the inflexibility of the operational pattern open to large, long-range landplanes, especially in war; the vulnerability of such runways as do exist; the serious loss of valuable agricultural land in the British Isles and elsewhere, and—something new, perhaps—the growing opposition of the public to airports, with their noise and possible danger, in built-up areas. A high percentage of all airline accidents occur on take-off or landing.

We are unable to ascertain the exact extent of the Corporations' support or opposition to flying-boats, though the opinions of some individual executives have been made plain enough. The aircraft industry is ready to prepare designs to meet the requirements. The R.A.F. is understood to be having significant second thoughts about flying-boats. Mr. Stout and others have indicated that boats need not be slow.

Are we, then, to kill or to foster the true liner of the air? It would seem timely for the public also to express its opinion and so take its part in a decision of national importance. And when better to do this than on the threshold of a new Elizabethan era?

SABRES

Keen American Weapons in the Commonwealth Armoury: Canadian Squadrons Here

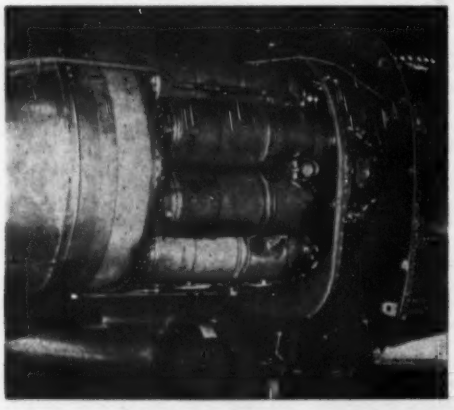
NO American fighter of the war was held in higher esteem by British technicians and pilots than the North American Mustang. This was not solely because it was built to a British specification and achieved the full measure of its fame with a Rolls-Royce Merlin engine, but because it was manifestly a brilliantly designed fighting aircraft. Already its lineal successor, the F-86 Sabre, is well on the way to achieving similar ubiquity and success.

Today the Sabre is the only fighter in service, other than the Swedish Saab J-29, which can rival the speed of the Russian Mig-15, and with later power plants than the General Electric J-47 at present standardized (an Avro Canada Orenda has already been fitted experimentally, and Australian-built Sabres will have Rolls-Royce Avons) its brilliant performance will be further enhanced.

Some sentiments concerning the forthcoming acquisition of Canadair-built Sabres by the R.A.F. are expressed in a leading article in this issue, and presented here is a set of *Flight* photographs secured during a recent visit to North Luffenham, where No. 410 (Cougar) Squadron, of the Royal Canadian Air Force, has been stationed since last November. No. 441 (Silver Fox) Squadron was due to arrive in Britain on February 20th, and a third squadron—No. 439 (Westmount)—is scheduled to take up station during the spring.

It was announced last week that Canadair have appointed Airwork, Ltd., as sub-contractors in the United Kingdom for the storage, overhaul, repair and maintenance of R.C.A.F. Sabres. The engagement is for an initial period of two years, and the maintenance standard must ensure combat readiness upon short notice. Hangar space at Speke, Liverpool, has been taken over by Airwork, Ltd., for the purpose, and key service-engineers are in Canada to study the special problems involved. Mr. M. D. N. Wyatt, chairman and managing director, and Mr. R. W. Cantello, general service manager, have just returned from a visit to Canadair.

The three-quarter view at the head of this page shows the finned drop tanks of an R.C.A.F. Sabre (even with these in place a Mach number well over 0.9 is attainable), and the fuselage-mounted dive brakes, while the head-on study discloses the fuselage cross-section. Of the lower views, one shows three of the six 0.5in. Colt-Browning guns nested snugly in the fuselage, and another illustrates how the rear fuselage can be removed for power plant servicing. Last is a line-up of maple-leafed Sabres of the Cougar squadron.



FROM ALL QUARTERS

ORANGE AND GREEN national markings distinguish these D.H. Chipmunks—three of six ordered for the Eire Air Corps to supplement the Miles Masters and Magisters at the E.F.T.S. at Baldonnel.

Sir Frank Whittle's Future

RUMOURS, current in London last week, that A. Cdre. Sir Frank Whittle is considering an invitation to carry out gas-turbine research work in the United States were later substantially confirmed by Sir Frank himself.

One columnist had quoted reports that the gas turbine pioneer "was profoundly dissatisfied with the opportunities he has been offered here." In an interview with *The Times* aeronautical correspondent, however, he is quoted as expressing himself "dissatisfied with the lines upon which gas turbines are being developed in this country." The same writer says that Sir Frank has long held the view that Britain's neglect of the centrifugal compressor in favour of the axial-flow type is a mistaken policy.

Sir Frank Whittle, it appears, has received invitations to transfer his talent to several countries. He has recently been invited to America "to discuss a proposition," but is deferring his decision until he knows whether the opportunity would enable him to follow the line of development he most favours.

Appointed a director of Power Jets (Research and Development), Ltd., shortly after the war, he was Technical Adviser on Engine Design and Production to the Controller of Supplies (Air), M.o.S., from 1946 to 1948; latterly he has acted as B.O.A.C.'s adviser on jet development.

It is clear that, so far as Sir Frank is concerned, his attitude is one of principle, and is not in any way concerned with money: in 1948 he was granted £100,000 free of tax on a recommendation of the Royal Commission on Awards to Inventors. Before this he had steadfastly refused, on the grounds that he was a serving officer, to accept any special remuneration in recognition of his jet-engine work.

Multiple Flight-refuelling for U.S.A.F.?

UNTIL recently, the high transfer-rate of the Boeing "flying-boom" system of flight refuelling was sufficient to justify its adoption as the standard system for the U.S.A.F. Lately, however, the British multiple-fuelling system—developed by Flight Refuelling, Ltd.—has been arousing a good deal of interest in America, and especially since extensive competitive evaluation of the two schemes has been made.

One of the advantages acknowledged is that the Boeing boom can feed only one aircraft at a time, while the British system can refuel three. Additional considerations are the bulk, maintenance requirements, and general complexity of the U.S. equipment, together with its high capital cost. These factors are the background to reliable reports that the Flight Refuelling method may, in modified form, be adopted by the U.S.A.F.

Long-range Jet Flying

IN the chair, when S/L. A. E. Callard, D.F.C., delivered his lecture of the above title before the Royal United Service Institution last week, was Air Marshal Sir John Boothman, C.B., D.F.C., A.F.C., Controller of Supplies (Air), who reminded the assembly of S/L. Callard's transatlantic flight in a Canberra, last February. The 440-m.p.h. average speed Sir John smilingly described as "mediocre," though he did not add that the Canberra had battled against stiff headwinds.

S/L. Callard outlined the relationship of various technical factors governing the performance of turbojet aircraft and then turned to the limiting factors, suggesting various possible improvements. His treatment of these two parts was necessarily of a somewhat mathematical nature, with liberally interspersed graphic illustrations; but his next theme—that of operating problems—was more readily expounded to the less technical members of the audience.

Turbojets, said S/L. Callard, were now very reliable; but assuming one failure in a four-jet aircraft, a 35 per cent reduction in range might result from the loss of height and consequent higher fuel-consumption. Should cabin pressure fail, a rapid loss of height would be imperative to ensure crew-survival—another consideration affecting fuel reserves. But, as the lecturer emphasized, "fuel is required to carry fuel"; therefore reserves must be calculated intelligently. He considered the present state of knowledge regarding wind speed and direction at height, and of temperatures also, to be seriously inadequate, and spoke somewhat wistfully of the "ideal case" where it would be possible to arrive at a destination with just sufficient fuel to taxi in; meantime, there were too many unknowns for which to budget. On his own transatlantic flight, as he recalled in reply to a question, he had arrived at Gander with more fuel remaining than expected, the air temperature during the latter part of the flight having proved considerably lower than for standard atmosphere. Thus, for a given pressure altitude the air was more dense; mass flow—and consequently thrust—increased, and the Canberra was enabled to fly higher, with a material gain in range.

Thanking S/L. Callard, Air Marshal Boothman remarked, "We have got the jet; we can't get away from it; and we haven't the chance to alter the pattern." Of flight planning he added that the degree of training of R.A.F. pilots and crews would not permit of their "making up their minds in the air."

Wheat or Bombs?

GENERAL EISENHOWER is said—reportedly by his Chief of Staff, Lt.-Gen. Gruenther—to have expressed himself as "extremely concerned" at the slowness of Atlantic Pact countries in building airfields and port facilities. France and the Low Countries are named in this context, and the report also says that Gen. Eisenhower "might have to be granted more authority." The matter arose at last week's preliminary meeting, in Lisbon, of the Military Committee of the North Atlantic Treaty Council.

Commenting on this news, a writer in the *Daily Mail*, remarks that U.S.A.F. officers have found an almost total lack of airfield facilities in France for newly arrived American wings. At the Merignac airfield, near Bordeaux, where the 126th Bombardment Wing, a key tactical formation, is stationed, there are no hangars or base offices and only a small concrete apron on which the 28 bombers can be parked.

Such shortcomings, of course, have long been recognized and have been the subject of comment in *Flight* on more than one occasion. Last June, for instance, in reporting official views at the conclusion of Exercise Ombrelle, we remarked upon the admitted lack of modern airfields in the western part of the Continent.

By reason of this deficiency in France, it has been suggested that disused airfields in East Anglia might be re-opened to receive medium bombers for the support of land forces in North-West Europe. From these bases they could operate as effectively as from any in Central France; but the extent to which reoccupation of such war-time airfields would prejudice farming and storage—to both of which activities they are at present devoted—has already occasioned some strong feeling in this country.

Old Soldiers

SO far as the Royal Air Force is concerned, the Avro Lancaster is now little more than a memory, for the type ceased to be operational just one year ago. Abroad, however, they are still in service. The Argentine Air Force has a number, and the French Navy is now taking delivery of 54 reconditioned aircraft of this type for anti-submarine duties. In Canada, no fewer than 400 Lancasters were built by Victory Aircraft, Ltd.—which later became Avro Canada—and a number are still in full service in several arduous roles.

Since the war, these R.C.A.F. Lancasters have been so completely rebuilt as to represent virtually new aircraft, and it is said that conversions may continue for several years. Mr. Sidney Howland, Avro Canada's flight test pilot and analyst, estimates that each aircraft requires some 175 modifications and 20,000 man-hours of work for complete rejuvenation. The "new" Lancs are equipped for various duties, including long-range

FROM ALL QUARTERS . . .

navigational training; photo-reconnaissance, mapping and surveying; bombing, maritime reconnaissance and anti-submarine work; and air-sea rescue.

At least one has been converted into a test-bed, on the well-known English formula, by replacing the outer Merlins with Avro Canada Orenda turbojets; this particular aircraft is stated to be capable of straight and level flight on one Orenda only, with the other three power plants shut down.

The present R.C.A.F. Lancasters are fully winterized and carry a great deal of new equipment not visualized in the original design. Although many have spent long periods deteriorating in dumps and maintenance units, they are now first-line aircraft once more, and there is every indication that they will continue in service for several years.

The First Avon-Comet Flies

AN appropriately unspectacular but extremely important first flight took place last Saturday, February 16th, when the first Series II or Avon-Comet made an entirely successful two-hour flight, returning to Hatfield at dusk. At the controls was de Havilland's chief test pilot, John Cunningham, and Peter Bois assisted him. Other members of the crew were A. J. Fairbrother (aerodynamics department); J. Marshall (instruments); and E. Brackstone-Brown (flight engineer).

This first Series II Comet is a Ministry of Supply prototype and No. 6 airframe off the line. While its flight-development programme is in hand the present batch of Series I and 1A Comets will be completed, and work will begin on the first production Series IIs for which B.O.A.C. and other operators hold options.

Series II Comets have axial-flow Rolls-Royce Avon turbojets in the 6,500-lb-thrust class and with appreciably better fuel consumption figures than earlier types of centrifugal turbojet. They will have wing tankage for 7,000 gallons of kerosine, which is sufficient for airline stage-lengths of 2,250-2,500 miles. The all-up weight is expected to build up by stages to a maximum of about 120,000 lb.

According to *The Sunday Times*, 45 Comets are now on order, and we believe that if what may be termed "firm options" are included, this figure may be even an under-estimate. The makers' latest announcement says that 35 are on order, of which 24 will have Avons. However, as mention has already been made of 22 Series Is and IAs, this might indicate that some of the first batch will, after all, have Avons, or more likely, that 46 at least have been spoken for; that all Comet Is of the first batch have been allocated was recently made clear.

The de Havilland company is understood to be making special efforts to increase the production rate of Comets. Shortage of manpower is the main problem, and the only solutions seem to lie in increased accommodation locally, even of a temporary nature, and/or the daily transportation of more workers to Hatfield by coach.

At Blackpool—But Not on Holiday

FROM Hawker Siddeley Group comes news that Mr. Edward H. Jefferson has been appointed resident director of Hawker Aircraft (Blackpool), Ltd., the company formed to manage the big Squire's Gate factory and airfield recently acquired by Hawkers.

Mr. E. H. Jefferson.

"This move shows how important we feel our Blackpool factory to be," said Mr. Neville Spriggs (general manager) last week. "Mr. Jefferson has been with us at Kingston for 31 years, and it is going to be difficult to spare him. But the normal problems involved in building up a new plant always need constant high-level attention, and he is obviously the man for the job."

Mr. Jefferson's first post with Hawkers was in the inspection department, and in 1922 he became the company's only inspector. The department expanded, and he became chief inspector in 1938. He was appointed quality controller in 1947, joined the board in February, 1951, and was made works director last June. He has, of course, been intimately concerned with the production of the P.1067, and he will need to pay frequent visits to Hawker's other plants, at Kingston, Langley, and Dunsfold.

AERODYNAMICS: The stabilizing tailplane of the new U.S.A.F. airborne lifeboat, described below, keeps the craft steady in the air before the parachute opens. Final acceptance tests have now been completed.

Automatic Airborne Lifeboat

ALTHOUGH survivors must still climb aboard by their own efforts, a new American airborne lifeboat relieves them of almost all further responsibility or physical exertion.

The all-metal craft is 30ft long and weighs 3,500 lb. After release from the carrying aircraft, the boat is lowered by parachute into the sea and guided by radio to the survivors. The radio and electrical control systems were developed by the Westinghouse Electrical Corporation, of Pittsburgh, from original equipment designed by the Wright Air Development Center, Dayton, Ohio.

Five frequencies are employed. The first signal, at 995 cyc/sec, operates a group of relays to jettison the tailplane, a second group to release a guard over the propeller, and further groups to open engine air vents, start an engine-compartment air blower, crank the four-cylinder petrol engine until it starts, and release a sea anchor. A second signal at 3,000 cyc/sec puts the boat into forward gear, and opens the engine to half-speed. For altering course, 650 cyc/sec produces a turn to port and 300 cyc/sec a turn to starboard. The fifth frequency of 1,390 cyc/sec is an emergency stand-by; if the boat's magnetic-compass steering fails, this frequency can by-pass it and act on the rudder directly.

When the survivors—a maximum of fifteen—are aboard, they can take over full control if they wish, or they can maintain electrical control *via* push-buttons or, if they are very weak, they can leave it to the airborne operator. Provisions for ten days are carried, together with fuel for 800 miles; permanent equipment includes a large solar still for drinking water, a "walkie-talkie" radio, and a canopy.

Operation Ski Jump II

SINCE the article "Ice-island Airstrips" (page 210 of this issue) closed for press we have been able to obtain further details of the ambitious project which it concerns.

Known as "Ski Jump II," the operation is organized by the Oceanographic Section of the Geophysical Branch of the U.S. Office of Naval Research, Washington. Its objects are officially stated to be "to gain knowledge of the Polar Basin and to reveal not only the most practical technique for operating and landing aircraft on sea-ice but also to test the endurance of craft and personnel exposed to extreme Polar environment."

The expedition is under the command of Cdr. V. J. Coley, U.S.N., and consists of 34 persons: some are civilian scientists and others are Service personnel. A P2V Neptune and an R4D (the U.S. Navy designation of the Dakota) left Patuxent River, Maryland, on February 10th in order to rendezvous at Point Barrow, Alaska, with another P2V. Point Barrow will be the main base for the expedition.

All three aircraft are equipped with ski/wheel landing-gear, and it is stated that "the Polar observations will be made possible by special equipment in the R4D, which is fitted-out as completely as a deep-sea oceanographic vessel."

"Poll Tax" on Airline Passengers

AS from May 1st passengers as well as aircraft will be subject to payment of a landing charge on arrival at any one of the State-controlled airports in this country. The charge will be at the rate of 5s. for each passenger arriving from European countries, and 7s. 6d. for each from outside Europe. Those travelling on internal services or from the Channel Islands and the Isle of Man will be exempt.

According to the Ministry of Civil Aviation the charges are in line with those made in other countries. The action is, however, unilateral, for, although I.C.A.O. and I.A.T.A. have been consulted, no agreement has been reached. An equivalent charge made at New York's international airport costs each passenger more than 10s.

The new charge, which affects all aircraft operating for hire or reward, is stated to have been introduced to make a contribution towards the cost of providing services and facilities for passengers at State airports. Last year a deficit of £2,300,000 was incurred.

Following the M.C.A. announcement, which was made last Monday, B.E.A. stated that the sum involved for them would be approximately £100,000 per year, which they could not at present afford; the charge, therefore, would have to be passed on to the passengers. A similar announcement was made by B.O.A.C., who stated that the cost in a full year would be between £30,000 and £40,000.

The total number of passengers concerned will be more than 2½ million in the current year. There will be no charge for passengers in transit who continue their journey without a break. No mention is made of charges for aircrew or of "season" landing-cards for regular air travellers.

A. Cdre. G. J. Powell—managing director of Silver City Airways, Ltd., whose main base of operations is Lympne—expressed some strong views on the new imposition. In past years during the summer months, but now all the year round, his company's aircraft make short-duration, high-frequency ferry services across the Channel, and, therefore, the additional charge per passenger is likely to have a relatively greater effect than in the case of the Corporations' medium- and long-distance flights. The Air Commodore feels this to be unfair to the "small-fare" passenger. He adds that Lympne—a State-controlled airport—is probably "one of the worst in the country," although it is probably the only one that makes any money. It has no passenger facilities and is "a mass of tumbledown huts."

His company paid about £20,000 last year in aircraft landing fees.

London to Castel Benito Record

AN English Electric Canberra B.2 (Rolls-Royce Avons) last Monday, February 18th, flew from London Airport to Castel Benito in Tripoli, North Africa, a distance of 1,469 miles, in 2 hr 43 min 48½ sec, at an average speed of 538.13 statute m.p.h. The flight was timed by the chief timekeeper and the official observer of the Royal Aero Club and, subject to official confirmation, will establish a new point-to-point world class record. On October 25th, 1949, a de Havilland Comet, undertaking a similar routine flight, covered the distance in 3 hr 23 min.

The Canberra has gone to Tripoli for experimental work under the research and development programme of the Ministry of Supply. The pilot was S/L. L. C. E. De Vigne, D.S.O., D.F.C., A.F.C., a Ministry of Supply civil test pilot, and the navigator was F/L. P. A. Hunt.

In August last year a Canberra flew the Atlantic from Aldergrove, Northern Ireland, to Gander, Newfoundland, in the record time of 4 hr 18 min 24.4 sec.

Congestion at New York's Airports

NEW YORK is in the throes of what may be called an airport crisis following the closing-down of one of its busiest airports, at Newark. Four principal airports in the region of the city of New York are involved, with some 1,000 movements daily. It will be remembered that a third serious accident in a period of two months, bringing the toial of fatal casualties to 118, occurred recently at Newark, and as a result of unexpectedly strong pressure from people living in the surrounding heavily built-up areas, the airport was closed down pending Congressional investigations and a report from an airline committee under Captain Rickenbacker.

As a result of Newark's closing, the traffic at La Guardia and other airfields has increased considerably, and this has brought public complaints from new areas. It has therefore been decided that the daily movements at La Guardia shall be limited to about 450 and all international flights handled by Idlewild. The American Services are co-operating by limiting their movements into New York, and private pilots are being diverted elsewhere so far as is possible. It is reported that the present congestion is having repercussions on several outlying airfields.

To Put the Record Right . . .

Last week, in giving details of some important reappointments among higher executives of the Bristol Aeroplane Co., Ltd., we published a portrait of Sir William G. Verdon Smith. The photograph intended, however, was that of his son, Mr. William R. Verdon Smith, who, with Mr. George S. M. White, has been appointed a managing director of the company. We print a portrait of Mr. W. R. Verdon Smith herewith.

SEND-OFF : H.E. Ahmed Abboud Pasha's Sealand (see below) shortly before its departure for Cairo. Left to right are : Mr. W. Hambrook, sales controller of Short Bros. and Harland, Ltd.; Rear-Admiral Slattery, managing director; Mr. A. W. Peacock, the purchaser's agent; Capt. S. Omar, personal pilot; and Mr. R. Flaxman, assistant designer.

Sealand for Egypt

IN America there is a demand for what might be termed the "little airliner"—a smallish twin, luxuriously appointed and with good one-engine-out performance on the light loads it would normally carry—for use as a privately owned "executive transport." A similar requirement quite often arises in Eastern countries, and we have more than once heard the Short Sealand suggested as being well suited to such rôles.

It seems appropriate, therefore, that a particularly attractive "luxury" version of the Sealand has recently been completed for His Excellency Ahmed Abboud Pasha, director of the Khedevial Mail Line (Agency), Ltd., of Cairo. Registered SU-AHY and christened *Nadia* the machine left the United Kingdom on Wednesday, February 13th, on its delivery flight.

The interior layout is designed for six passengers and the seats are capable of being reversed to face either forward or aft. The walls and ceilings of the cabin are lined with blue natural hide, and dark turquoise silk damask curtains embroidered in pink have been fitted to the cabin windows. Crew accommodation is for pilot and co-pilot, dual controls being provided, and a toilet compartment is fitted in the forward cabin. Special fittings include leading-edge fuel tanks to bring the total capacity up to 185 gallons (this is the first example of leading-edge tanks on Sealands—their comparatively short range had previously been the subject of adverse comment); provision for air circulation and conditioning; and anti-glare protection for the pilots. Mr. D. Tanton, the manufacturers' staff pilot, and Capt. S. Omar, personal pilot to the new owner, undertook the delivery flight.

France Gets Sikorsky S.55 Licence

THE President-General Director of S.N.C.A.S.E., M. Georges Hereil, recently signed a contract for the construction of, initially, two hundred S.55 helicopters under licence from the Sikorsky Division of United Aircraft Corporation. Final assembly and most of the construction will be done in France, although Italy, and possibly Germany, will co-operate in the manufacture of sub-assemblies.

Viking Accident in Sicily

A VIKING *en route* from Bovingdon to Nairobi struck the slopes of Monte Rosa in Sicily at a height of about 3,500ft during a storm last Saturday evening. Thirty-one people on board —26 passengers and crew of five under Capt. A. W. R. Perry—were later reported to have lost their lives; some reports said that 34 bodies had been found. The aircraft had taken off from Nice after lunch to fly the leg to Malta, and after its non-arrival had been reported, an R.A.F. Lancaster based on Malta reported seeing wreckage on the mountain. A last signal had been received as the Viking left Sardinia at 2,200ft.

Hunting Air Transport, Ltd., the operators of the aircraft, have made daily air-trooping flights to Malta since August last year, using 34-seat Vikings, and have been operating similar aircraft on the routes to South Africa since 1947. They have been making other regular flights in connection with the groundnuts scheme from 1948 onwards, and also flights to East Africa. In all these services, there has been no previous fatal accident.

HERE AND THERE

JEEP JUMP: A Hastings of an R.A.F. parachute training unit in the Suez Canal Zone drops the first of its two jeeps during a training exercise staged by the 16th Independent Parachute Brigade Group; the first of the paratroopers waits in the door to follow the vehicles earthward. Note the "crash-pans" on the wheels of the jeep, which is landed by four parachutes. The shroud-lines are so fine as to be virtually invisible in this photograph.

The Next Valiant

THOUGH no target date has been announced for the first flight of the second Vickers Valiant four-Avon bomber, Vickers-Armstongs, Ltd., state that it will very likely take the air towards the end of next month. In view of the time normally occupied by ground-running and similar tests, this news suggests that the aircraft is already virtually complete.

Flying Studio

NO fewer than 18 cameras are installed in the U.S. Navy AJ-2P reconnaissance aircraft, the first of which has been completed by North American at the former Curtiss-Wright plant at Columbus, Ohio. With two P. and W. R-2800 piston-engines in the wings and an Allison J-33 turbojet in the tail, it is a development of the AJ-1 Savage, but remains distinct from the XA2J-1 (two Allison T-40 turboprops) illustrated in *Flight* of January 18th last.

R.A.F in Greenland Expedition

ROYAL AIR FORCE arctic equipment will be put to good use later this year in connection with the British North Greenland Expedition, one of the objectives of which is to study the structure of the Greenland ice-cap. This expedition—consisting of about a dozen scientists assisted by a similar number of Naval officers—is due to sail in July, and will receive a considerable measure of air support in the shape of Sunderlands of Coastal Command and aircraft of Transport Command. The former will act largely as reconnaissance aircraft, while the latter will make a number of supply-drops to enable the expedition to establish its forward bases. Quite apart from the original scientific purpose of the expedition, these operations should provide valuable training for the aircrews involved.

Equipment for Portugal

THE U.S. aircraft-carrier *Tripoli* arrived in Lisbon last week with another nine aircraft of the consignment earmarked for Portugal under the mutual defence programme. Another American vessel brought spares and equipment.

Modellers' Day Out

ONCE again Hawker Aircraft, Ltd., have placed their Langley Airfield at the disposal of the Northern Heights Model Flying Club for that organization's annual gala day, to be held on Sunday, June 29th. As usual, the Queen's Cup contest will be the principal event at the meeting, which annually attracts thousands of enthusiasts from all parts of the country.

PARASOL: Typical of the thorough American approach to such matters is this carefully designed canopy, designed to give shade to Northrop ground staff employed on cockpit adjustments during intervals in the flight-testing of F-89As. In this country an umbrella version might be more appropriate.

Surplus Aluminium

ALTHOUGH aluminium is in very short supply in the U.S.A., a huge quantity—estimated by some officials as exceeding 20,000,000 lb dead weight—is going spare. The U.S.A.F., to whom it was originally allocated, now find they cannot use it; it will probably be used to help producers of light metal products to meet outstanding orders, although the U.S. car industry is very anxious to get its hands on it.

G.O.C.'s Helicopter

IT was reported from Kuala Lumpur last week that Major-General R. E. Urquhart, G.O.C. Malaya, has begun to use a helicopter—presumably a Westland-Sikorsky Dragonfly—for personal transport. In it, he flew into a remote North Malayan valley into which a Special Air Service Regiment had parachuted three days previously; he was accompanied by Lt-Col. Sloane, commander of the Regiment. This may be the first time a British G.O.C has used a helicopter in actual operations.

Sailplane Duration Record

IT is reported from France that two instructors of the S.A.L.S. have broken the world duration record for two-seat sailplanes, with a time of 52 hr 37 min. They are M. Carraz and M. Brunswyck, who flew a Fouga Mauboussin C.M.7 from the airfield at Alpilles; a mistral wind of between 30 and 80 m.p.h. was blowing during the period February 4th-6th, when the flight took place. The previous record, held by Germany, was 50 hr 26 min, established in 1938.

The Human Machine

WAYS and means of ensuring the greatest efficiency in the use of the country's manpower will be discussed at the "Human Relations in Industry" Conference which the Ministry of Labour and National Service is holding in London from March 18th to 20th. The principal object is to discuss methods by which use of modern employment-techniques can be stimulated. The conference will be held at the headquarters of the Institution of Civil Engineers and further particulars can be obtained from the Director of Public Relations, Ministry of Labour and National Service, 8 St. James's Square, London, S.W.1.

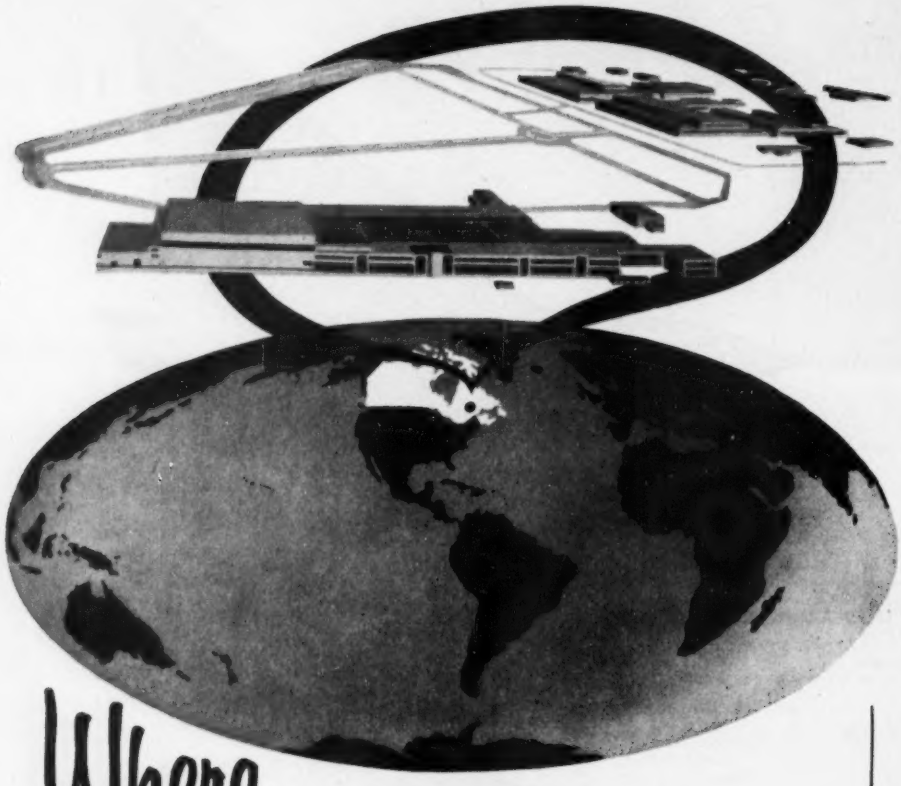
The importance of being a Delta . . .

To-day, recognition is steadily growing throughout the aviation world that the Delta is the aircraft design of the future . . . the logical airframe to give better performance at higher altitudes over long ranges at greater speeds. It is significant that A. V. Roe has already achieved many scores of flying hours on the Delta planform with their 707 A & B Deltas. Such practical experience is the true source of future progress and world leadership.

AVRo DELTA

A. V. ROE & COMPANY LIMITED, MANCHESTER

MEMBER OF THE HAWKER SIDDELEY GROUP
PIONEER . . . AND WORLD LEADER IN AVIATION



Where IS CANADAIR?

Canada is one of today's leading industrial countries of the world . . . and the home of Canadair, one of the most up-to-date and compact plants of its kind anywhere.

Located near the great industrial city of Montreal, Canadair has all the vital requisites of a smooth running aircraft plant . . . abundant hydro-power and basic raw materials . . . ample labour potential . . . close availability to sub-contract facilities.

In this setting Canadair is now mass producing F-86* Sabres, one of the world's best jet fighters . . . is soon to follow with jet and transport trainers for the Royal Canadian and the United States Air Forces.

For further information: European Representative, J. H. Davis, Princes House, 190 Piccadilly, London, W1, England.

Montreal's famed No. 426 Thunderbird Squadron of the R.C.A.F. Transport Command recently celebrated its 300th trip on the Korean air lift, flying Canadair-built North Stars. Still maintaining its Pacific ferrying schedule of 15 round trips per month, the squadron now air supplies the No. 1 Fighter Wing established in England. And thus is being written another glowing page in the annals of Canadian air history as young Canadian pilots in Canadian-built planes make their contribution to world freedom.

Canadair
LIMITED, MONTREAL, CANADA

*Made under licence from North American Aviation Inc.

HERE AND THERE . . .

Philatelic Auster

THE Falkland Islands—to which Argentina is laying claim—issued a new series of postage stamps on January 2nd. Each depicts an aspect of life on the islands, and the fourpenny denomination features a Mk 5 Auster. The island authorities employ three of these aircraft for various duties, two being floatplanes and the third having wheels or skis as occasion demands. One of the floatplanes was originally brought to the Falklands by the survey ship *John Biscoe* to assist in taking off a party of scientists who had spent three years in the Antarctic. As will be seen, the stamp bears the head of our late King, so a revised issue will presumably appear.

The new stamp.

Metamorphosis

THE classic story of the passed-by-mouth army signal that started as "Send reinforcements, we are going to advance" and finished as "Send three-and-fourpence, we are going to a dance" is recalled by a recent reference in these pages to "Revolution Airlines" (in the article *Alaska's Airlines*, February 8th). A comparable feat of corruption had been achieved, for the name intended was "Reeve Aleutian Airways," a company which operates between Anchorage and the Aleutians with DC-3s. We are indebted to *The ABC World Airways and Shipping Guide* for pointing out this odd slip.

NEW VIEW of Saab's Type 210 delta-wing research aircraft (Armstrong Siddeley Adder turbojet) indicates that the main wheels retract forwards. Notwithstanding the small dimensions of this ambitious little machine, it has been possible to instal an ejection-seat, of Saab manufacture.

IN BRIEF

MR. R. E. Mitchell has been appointed a director of Metalastik, Ltd., the Leicester specialists in rubber-to-metal bonded components.

* * *

It is with regret that we learn of the death, which occurred on February 3rd, of Mr. Gordon Harvey Field, C.B.E., former director of research at Aluminium Laboratories, Ltd., Banbury.

* * *

A new leaflet from Hellermann Electric Ltd., Crawley, Sussex, lists a range of "P" clips now marketed by the company. Made of aluminium and covered with synthetic rubber, these clips are stated to be resistant to most aircraft fluids, and to extremes of temperature.

* * *

Avro Canada announce that Mr. L. F. McCaul has been appointed sub-contracts manager of the company's aircraft division. Mr. McCaul has been associated with the aircraft industry since he joined the Curtiss Aeroplane Co. at Buffalo in 1913; during the 1939-45 war he was in charge of production and procurement for Victory Aircraft, Avro Canada's predecessor.

* * *

Mr. R. Dean Roberts, formerly personnel manager of Fords at Dagenham, has recently taken up the appointment of director of personnel for the David Brown Group. A former chairman of the Staff Management Association, Mr. Roberts was also a council-member of the Institute of Personnel Management, from 1945 to 1951.

Mr. Dean Roberts, whose new post is announced here.

* * *

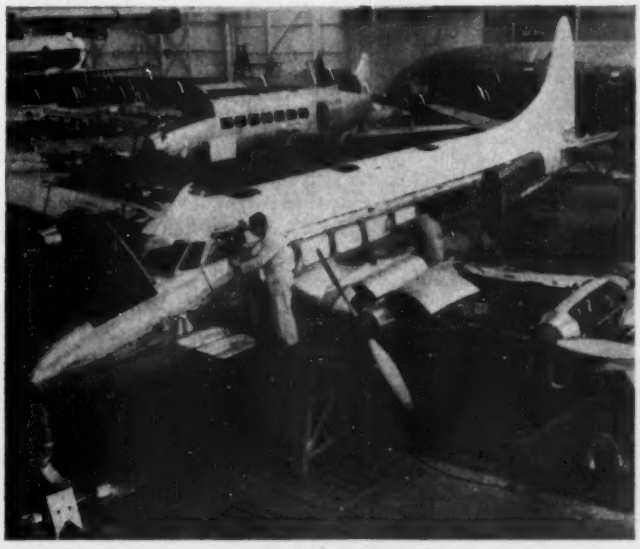
The administrative offices of D. A. Daniel and Co., Ltd., makers of aircraft heaters and associated equipment, are now at Fitzherbert Rd., Farlington, nr. Portsmouth, Hants. (Cosham 76451-3). The principal production centre remains at Machynlleth, under the charge of Mr. F. Sandham, production manager.

* * *

Mr. F. C. Lynam, F.R.Ae.S., the technical director of the Airscrew Company and Jicwood, Ltd., of Weybridge, Surrey, has been appointed general manager of the company. Mr. Lynam, who joined the board in 1946, was apprenticed as a naval architect; he joined Metal Propellers, Ltd., 1928, and was appointed a technical assistant at the Airscrew Co., Ltd., in 1934.

* * *

Since undercarriage efficiency is a primary requirement in a trainer, the fact that Dowty "Liquid Springing" is specified for the new Fokker S.14 Derwent-powered two-seater is a tribute to the suitability of this system. Three other Fokker types, the S.12, S.13 and F.25 Promotor also make use of it; in the case of the S.12 and F.25 the complete main and nose undercarriage units are of Dowty manufacture.



HERONS ON THE WAY: Two production models of the de Havilland 14/17-seat feederliner (four Gipsy Queen 30 Mk 2) in the assembly shop at Hatfield, with a Comet's nose visible in the background. A retractable-undercarriage Heron, the Series II, is reported under development.

PASSENGER round the WORLD

—by All-British Airlines: An Australian Writer's Impressions

By DUDLEY OSBORNE

THE author is aviation editor of "The Sydney Daily Telegraph," and this account of a recent 15,000-mile trip eastward from Australia to England via North America contains some pertinent comments on aviation affairs in the United States and Canada

THE intention in making this flight—or rather, series of flights—was to girdle the globe by an all-red route (in the pre-Stalin interpretation of the word "red"), travelling throughout by airlines of the British Commonwealth. Different airlines were used for every section, in order to make comparisons, if any.

The departure was from Sydney, Australia, early last month, in the middle of the summer there. My purpose of flying into the contrasting cold and discomfort of the western world was deliberate—it was to see whether normal flying schedules and operations were able to be maintained during the worst of winter conditions, and also to observe and report on aviation affairs, *en passant* as it were.

Carrying a heavy coat, muffler and snow-boots through Mascot air terminal, Sydney, while the temperature gasped around the 106 mark, occasioned some uninhibited comment among the staff there.

The first section was to Canada *via* Canadian Pacific Airlines' service. C.P.A., who recently announced details of their proposed Comet service over a portion of their Australia-Canada route, have been operating little more than a marking-time service since they started this route nearly three years ago. Lack of equipment, accentuated by obligations to operate a Korean airlift from North America, has so far kept the frequency down to one service a fortnight. However, the company have made the best possible use of their Canadair 4s which fly the run, by offering free stop-overs, with organized tours, at Fiji and Honolulu. How far this sightseeing *versus* speed affects passengers to North America in their choice of which ticket to buy is difficult to assess; but some, no doubt reacting to the thought, "I shall pass this way but once," do prefer the more leisurely flight.

The Canadair, similar to the Argonaut, is a comfortable aircraft in which to fly, except that there is a tendency to noise from the four Merlin engines. C.P.A. expect to have the Comet service operating late this year as far as Honolulu, where passengers will transfer to DC-6Bs scheduled for delivery this autumn. The company's executives expect that they will then "have an edge" on their powerful competitors on this route, Pan American and B.C.P.A.

C.P.A.'s director of operations, Capt. John Pentland (formerly of B.O.A.C.), piloted the aircraft over most of the route, but at one stage the company's president, Mr. G. McConachie, took over. Mr. McConachie—or "Grant," as he seems to be called by his staff—keeps all his licences up to date, and C.P.A. employees maintain he is the only international airline president who still acts regularly as pilot on his company's routes.

A 13-hour stop-over at Fiji gave passengers a chance to sleep in a conventional bed. Despite the rather back-o'-beyond nature of the island, accommodation and food at the Lautoka Hotel compared more than favourably with the general run of such things available in Australia.

Fiji residents are proud to have gained, recently, a regular air service. Run by Harold Gatty, former round-the-world flyer, with two de Havilland Rapides, the line is providing a useful service across Fiji and to the surrounding islands.

On the resumed flight, our aircraft made the usual refuelling stop at Canton Island. Only airline, civil aviation and postal officials live at Canton, each man doing a six to nine months' stint on this isolated, mile-and-a-half-long, men-only coral atoll. During our halt there, I learned that the isolation leads some of the men, and especially the younger ones, to look forward with more than usual anticipation to the brief contact with passengers who sail on the liner service between Vancouver and Sydney. As the stay is not very long, the more ardent young men—celibates, as it were, of Canton Island—adopt a rather direct approach to the unescorted females on board.

Honolulu, though in its theoretically "off" season, was crowded to summer capacity with visitors. All airlines report capacity flights from the U.S. and Canada, and that there has, in fact, been no "off" season this year. The Matson shipping line has added to its Honolulu hotel string with the huge Surfrider Hotel at Waikiki, built in about 12 months and, like all the other hotels, crowded to capacity.

Honolulu must be one of the world's busiest air-traffic centres, for, in addition to constantly increasing civil airline traffic, the U.S. Military Air Transport Service brings wounded from Korea into Hickam Field, almost adjoining the civil airport. There, also, the military operate an air, land and sea rescue service with S.51 helicopters.

Honolulu was filling up in preparation for a forthcoming travel conference which the enterprising Tourist Bureau was organizing, and top brass from every airline which serves the South Pacific was assembling in force.

Long Ocean-crossing

Weather so far had been ideal. But the long flight from Hawaii, over 2,700 miles of sea to the American coast—reputedly the longest over-sea route in the world—took the aircraft through worsening conditions, until, at 17,000ft, we were above the weather and in clear sky. The aircraft refuel'ed at San Francisco, then continued to Vancouver, where it landed by I.L.S., dragging in past snow-covered fields and under thick clouds. Despite the extra orbiting involved in using the landing aid, we were only 25 minutes late.

C.P.A.'s vice-president, Mr. Hugh Main, showed me over their new seat-reservation centre, now almost complete. The principle employed is one of visual booking-control, with the seating state of each flight shown on one end-wall. Telephone operators give immediate acceptance to passengers booking on flights which are still "open" on the board. Slips booking the flight are then put on a conveyor belt, where they go to a "shift-master," a girl who marks a seat chart of each flight. When only two seats are left on the aircraft, the shift-master puts a yellow caution disc on the flight, and operators then have to refer before accepting a booking on it. When the aircraft is sold out a red disc goes on the board, and the operators then offer callers the nearest date.

Vancouver airport officials point proudly to a piece of sculpture as a remarkable example of anticipation. Erected about 15 years ago, it represents a rocket ship, in stone, poised in flight, and it looks very much like drawings appearing from time to time of secret projectiles.

Although we had already called at San Francisco, passengers who, like myself, wanted to go there eventually, were not permitted to leave the airport. C.P.A. have no landing or pick-up rights in the U.S.; they are one of many companies who are becoming affected by the whole question of reciprocal rights in the Pacific. There is an increasing tendency for governments to spoon-feed their own national carriers, and to restrict other airlines against picking up or setting down passengers at places where they stop during the flight. It is doubtful whether these practices help anybody in the long run, because the only way to popularize a certain route is by having as many carriers as possible flying their aircraft on it.

After visiting Vancouver, I travelled back as far as San Francisco

(Left) A C.P.A. Canadair of the type in which the author made the first part of his journey.

(Right) The final stage of the trip, from Montreal to London, was made in a B.O.A.C. Stratocruiser.

by British Commonwealth Pacific Airlines' Australia-bound DC-6 service. B.C.P.A.'s direct service to the American city is a regular dollar earner, because the U.S. carriers call at Seattle and Portland.

Though there was a 30-minute delay in take-off, due to weather, the DC-6 made the 795-mile flight comfortably in two and a half hours. San Francisco was wrapped in one of its chronic winter fogs, and the pilot had to use I.L.S. to get in.

American hustle and efficiency does not apply to the Customs and immigration departments at San Francisco international airport. These have to operate in one small shared office, and one airliner-load of passengers and their luggage crowd it uncomfortably. Examination took about an hour to complete—about twice as long as any other airport visited. In fairness to the polite officials who work there, I should add that one explained that most overseas visitors by air to the U.S. enter American territory at Honolulu. San Francisco serves only visitors arriving direct from Canada. "We'll have proper facilities in the new building now under construction," an official said.

Airline circles in San Francisco, and especially the big operators —T.W.A., United and American Airlines—told me of their serious concern with the operations of non-scheduled carriers who are currently very active on the West Coast. The "non-skeds," as they are called, have been advertising cut rates on the popular San Francisco to New York and Chicago flights. The Attorney-General's department has been inquiring into the operations of some unscrupulous non-skeds, and the San Francisco Better Business Bureau has lodged complaints.

A United Airlines official said, "Nobody objects to legitimate charter operators, but the nomadic non-skeds only want to take the cream off the best services when traffic is at its busiest—and they're not always particular how they do it." The usual procedure is for a ticket agent to set up office in a city hotel, advertise as Something-or-other Air Lines, and try to charter an aircraft when he gets a handful of bookings. Few of the non-skeds actually own aircraft.

As an instance of one of the pitfalls of this haphazard method of airline operating, I was told: "A party of soldiers returned from Korea made up a plane-load recently to go to New York. At Chicago, one engine of the DC-3 packed up. The pilot tried for a day to buy a spare in the district, found he couldn't, so left for Los Angeles by an afternoon plane. The following morning the soldiers found they'd been dumped."

A snowplough clears the taxi-tracks at Dorval, Montreal.

The regular operators have now inaugurated a "coach-fare" rate of 99 dollars coast-to-coast to counteract the non-skeds; but the services are so busy that people are often tempted to take a chance with irregular operators. Federal action may be necessary to protect the public against the worst abuses of mushroom airlines.

After returning to Vancouver by B.C.P.A., it was necessary to stay overnight because of heavy bookings for the Trans-Canada Airlines flights, on one of which I was scheduled to cross Canada. This experience of boom conditions in air travel in North America was general throughout my stay there. For the first time, winter traffic is as heavy as summer. Almost every one of T.C.A.'s 100 daily flights is heavily booked.

The temperature at Vancouver when we left was a near-mild 38 degrees. But by the time T.C.A.'s North Star had reached Calgary, our first stopping place, it was as many degrees below. The flight over the Rockies was made at night, and Canadians told me that I had therefore missed what, they told me patriotically, was the finest scenic flight in the world.

My connection at Calgary was delayed two hours because of blizzard conditions which had held up take-off at Vancouver. But the airport building was warm and comfortable, and there was an all-night restaurant.

Smoothing the Way

At Toronto, where I spent a day, the U.S. Customs and immigration had that week inaugurated a new service which should bring whoops of joy from every international air traveller. Passengers flying to the U.S. from the Canadian city now pass American Customs and immigration before they enter on the aircraft. At their destination, they leave the airport without formality.

I.A.T.A. and I.C.A.O., whose representations brought about this new scheme, are hopeful that the idea will spread to other countries. Sir William Hildred, the dynamic Yorkshireman who is director-general of I.A.T.A., told me in Montreal that he considers it one of the most important achievements to date in the Association's campaign to simplify international flying for travellers. Were the system to be applied in England, it would mean, for example, that a French customs-immigration team would be stationed at Heathrow, and British officers in Paris.

At Montreal I took the opportunity of visiting the Canadair plant. Now the largest aircraft factory in Canada, covering 40 acres, the factory was bought from the Canadian Government in 1946 by the Electric Boat Company. This concern, American manufacturers of submarines, took to the new line of business with great success, and they expect almost to double their payroll this year from the present 6,000. Three-quarters of the workers are French-speaking, but my escort, Mr. A. Ainger, said that labour relations between these and the English-speaking employees are excellent. "Foremen, though, have to be bilingual," Mr. Ainger said.

The plant is currently in full production of F-86 Sabres, and during my visit the 200th was just coming off the line. Tooling-up is going ahead for production of the T-33, the dual-controlled version of the Shooting Star. A specimen T-33 was at the company's hangar. In comparison with the comparatively "short-legged" English jets, this aircraft stands rather high off the ground; it looks impressive, with sleek lines.

Canadair's carpentry shop was building a mock-up of the T-36 navigation trainer, for which they gained a contract recently. This is an all-metal, low-wing job, with ten backward-facing seats; one can see possibilities for it as a feederliner when civil aircraft manufacture is again a possibility.

Montreal and New York airline offices report, in chorus, capacity business for the new tourist-fare services which start on May 1st

PASSENGER round the WORLD . . .

over the North Atlantic. The joint announcement by the 11 companies who will operate the tourist fares had appeared a few days previously in the U.S. and Canadian press. Mr. G. McDougall, B.O.A.C.'s Montreal manager, said that his office alone had booked more than 600 "tourists" within the first seven days after the announcement. "And not one of the passengers has travelled by air before to the U.K.," he added.

It seems that operators' forecasts that tourist fares will open up a new transatlantic market is likely to be realized. The number of travellers from this side who will be able to take advantage of the bargain rates is, of course, still limited by dollar restrictions; but at least we can look forward to an increase in dollar-spending visitors.

Promptly at take-off time, the B.O.A.C. Stratocruiser in which I was to fly to England left Dorval Airport, Montreal, and headed over the dark Atlantic. Roger, a 12-year-old travelling alone in the seat behind me, was crying softly to himself. A sympathetic hostess chaffed him out of it. "He doesn't want to go back to school," she whispered to me.

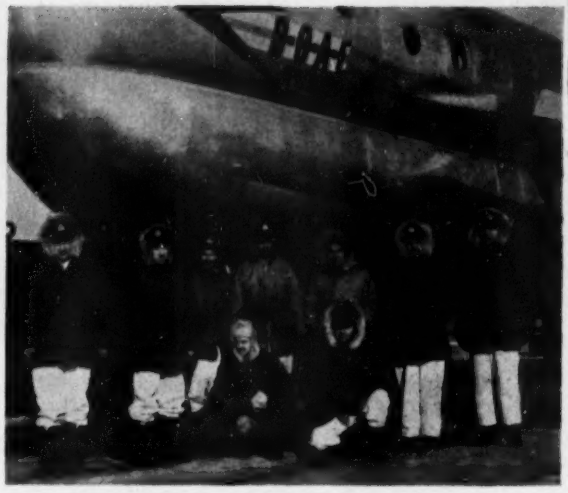
"I felt like that about a two-mile journey to lessons when I was his age," I said. Roger travels between Canada and his London school every holiday period, in order to spend his vacations with his father.

B.O.A.C. serve carefully thought-out, adequate meals during the flight. Passengers' digestions, especially when they are English, and are therefore associated with austerity-shrivelled stomachs, should always be protected against their owners in this way.

Our flight-plan called for a 9½-hour direct flight to Prestwick. There was slight turbulence as we went out over St. John's. About dawn the B.O.A.C. skipper, Capt. Woodman, invited me on to the flight deck. From the height at which we were flying, the horizon fell away at the sides in a gentle parabola which the rising sun tinted to a rosy pink. We were running about 45 minutes behind schedule because of a temporary 130-m.p.h. head-wind which had no right to be there. Then down through swirling cloud until we came out over the Scottish coast and to a soft landing at Prestwick.

After refuelling passengers and aircraft, the flight over the uniformly neat English countryside to London was only a short hop. Grey mist was closing in on Heathrow when we landed. Half an hour later, the weather was "clampers".

I said to Roger as we went through the terminal building, "I suppose you'll have an interesting story to tell your schoolmates about the flight."



Snowmen: B.O.A.C. engineers prepared for the worst at Dorval.

He looked at me scornfully. "All we did was take off, and fly, and then land again," he said.

Time was when a journalist could thrill his readers with wonder as he tapped out a story of how he dined in Canada and breakfasted in England. Now, as Roger said, all you do is take off, and fly and then land again. It's as simple as that.

Which is as high a compliment on the reliability of 1952 air travel as you could wish to have.

On the 15,223-mile flight eastwards across the world, I had been held up, in all, for 3 hours 10 minutes. The next stage, *via* B.O.A.C. and Qantas, is through the Middle East, homeward, to "down under".

TECHNICAL TELEVISION

WHEREAS to most people the term TV suggests fireside entertainment, a recent paper read before the Royal Society of Arts demonstrated the immense value of television techniques in a number of more serious fields.

The author, Mr. J. D. McGee, M.Sc., Ph.D., A.M.I.E.E., of E.M.I. Research Laboratories Ltd., divided his paper into three main sections: the extension of human vision made possible by TV, the increased range of light wavelengths which could be "seen", and the capacity for visual memory.

He expressed surprise at the past lack of exploitation of such fields, but said that this phase appeared to have ended—the future would probably see a much more widespread use of television in a number of applications.

Under the "extension of vision" heading, Mr. McGee spoke of colour TV of surgical operations, submarine television—the first application of such a camera as a substitute for a human observer in difficult or dangerous situations—and the use of TV in connection with dangerous processes and guided weapons. The two last headings were combined in a discussion of atomic-weapon research, whilst the paper also dealt with the simplicity of televising structural failures in radio-controlled aircraft—in which connection, what might be termed "chairborne test-pilots" were mentioned.

The subject of guided weapons was naturally restricted by security, but Mr. McGee's paper recorded an interesting series of experiments which took place in 1938-9, in which transmission from an airborne TV camera was studied in the E.M.I. laboratory at Hayes; ground targets were easily identifiable up to ranges of over 50 miles. This had led to discussion upon the use of television as an accurate guide to the flight of, for example, a guided missile for use against small targets.

Under the heading of "increased range of wavelength," the paper discussed the use of television with infra-red and ultra-violet radiation.

The sub-headings of the "television memory" section were "radar display"; "transmitting pictures over a narrow frequency-band circuit" (for still, or slowly varying, picture transmission); "stroboscopic television;" and "television in astronomy.".

SPECIAL GAS-TURBINE COURSES

THE School of Gas Turbine Technology, Farnborough, is to hold three detailed and highly specialized courses this summer. Normally, the school's courses cover the overall picture of gas-turbine design as comprehensively as possible in the space of three weeks. Three special courses, however, have been arranged, each of which will take one component and devote a whole week to dealing with it in detail. This instruction is primarily intended for those already engaged in design-work.

The first course, from June 30th to July 4th, will deal with the theory and design of compressors; the second (July 7th to 11th) with combustion and the design of heat-exchangers; and the third (from July 14th to 18th) with the theory and design of turbines.

Other S.G.T.T. courses arranged for this year are as follow: practical aircraft-engine courses, February 25th-March 7th, June 9th-20th and October 6th-17th; aircraft-engine design, May 12th-30th, August 11th-29th and November 24th-December 12th; international courses on aircraft and industrial gas-turbines, March 17th-April 4th and September 8th-26th; design and applications of industrial gas turbines, April 15th-May 2nd and October 27th-November 14th.

The design courses are of approximately post-graduate standard and are open to students of British or Commonwealth nationality. They include the running and testing of gas-turbine power units, together with performance calculations. The industrial design courses also include specialist lectures on economics and on the use of gas turbines for power generation, ship propulsion, land traction and process-plant installations.

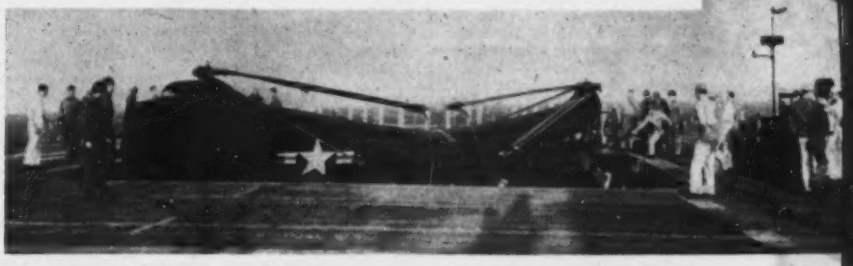
The international courses are for foreign students only, and are a combination of the aircraft and industrial design-courses, thus covering all applications of the gas turbine.

The practical aircraft-gas-turbine courses are open to students of any nationality. These courses are concerned principally with stripping, assembly and installation work, and do not require a high standard of academic knowledge.

All courses start at 9 a.m. on Mondays and finish on Friday afternoons.

HELICOPTER ASSAULT

Possibilities of Landing Troops in Strength on Hostile Territory: Lessons of U.S. Marine Corps Exercises



Most of the experience on which Lt.-Col. McCutcheon's opinions were based was obtained with Piasecki HRP-1 helicopters at the U.S. Marine Corps School at Quantico, Virginia. This school is engaged upon the development of the helicopter invasion technique, in which it has employed the U.S.S. "Palau" as a helicopter-carrier. This photograph shows an HRP-1 being brought up in the lift with rotor blades folded, while at the foot of the page the carrier is seen with eight HRPs ranged on her flight deck.

ANALYSIS of the results of exercises held last year by the U.S. Marine Corps, utilizing Piasecki HRP helicopters and CVE escort carriers of the U.S. Navy, has suggested new and important possibilities for the helicopter in active warfare.

During these exercises, basic techniques were worked out that should be applicable on a very large scale to much greater numbers of helicopters and carriers. The operation of numerous rotary-wing aircraft from carriers presented some peculiar problems, but, even so, they were thought to be less complex than those encountered in present carrier-borne jet-fighter practice.

Reviewing the results of the exercises in a lecture to the S.A.E., Lt-Col. K. B. McCutcheon, U.S. Marine Corps, said that it had been found quite practicable to embark a complete invading force—on a small scale—in a single carrier, this including pilots, mechanics, and assault troops. The Piasecki aircraft used were equipped with folding rotor blades, and could be housed in the ship's hangars until required. In preparation for an assault, the aircraft were brought up to the flight deck and ranged as closely as their numbers required, while the pilots and troops were being briefed.

The operation was under the control of the carrier's air officer in the island superstructure, who was assisted by the retention of the coloured-helmet scheme used for the ready identification of flight-deck personnel. In early exercises, the helicopters had been launched from both bow and stern of the carrier, leaving the major deck area clear for manual ranging; it had since been found that the assault aircraft could be launched from anywhere on the deck, and the procedure was at present rather flexible.

The exercises had shown that actual launching could be performed while all the ships were under way, and in a dispersed formation—a feature which represented a distinct advantage over the use of waterborne landing craft. Once airborne, the force could proceed to the landing area either in close formation, or by individual routes to give a dispersed assault. Even when the operation was restricted by the slow cruising speeds of the HRPs (60 to 100 m.p.h.) it had been found possible to land an invading force over a space of 40 miles by helicopter in the time which a water-borne army would take to cover 8000 yd.

A further advantage, said Lt-Col. McCutcheon, was the fact that the landing need not necessarily be made on the enemy beach, but could take place at any distance inland. This area would previously have been subjected to bombardment from the air, and from the sea if possible, while the actual landing would be screened by a number of methods, including low-flying to take natural advantage of the local terrain, and the use of air-laid smoke-screens. The actual landing would be made under the cover of fighters and attack aircraft.

The helicopters could alight anywhere that an invading army could want to be placed, while preserving the tactical formation that the force would wish to assume upon going into action. With larger aircraft, shortly to enter service, whole regiments could be transported intact, and placed behind natural cover in any desired situation.

One of the first calls from a landed force was usually for artillery. The best practice had been found to be the landing of the gun crew in advance of their piece so that they could direct the helicopter pilot to the precise location in which they wanted the weapon placed. The use of a sling hoist enabled the pilot to release the gun quickly and accurately, so that it could go into action at once. This "flying crane" technique could be applied to almost any kind of war material; even in thickly-wooded country, the helicopter's powers of hovering permitted the accurate lowering of supplies by crane.

Helicopters retained certain of the advantages of water-borne landing craft, which had been lost upon the introduction of gliders and parachutes as means of delivering invading armies. They were essentially two-way vehicles, and could carry, not only the army, but anything they might require to sustain them in combat. After putting down the first assault force, they could return to their carrier and bring in reinforcements, ammunition, and many other requirements, while on the return journeys, they could evacuate wounded direct to a base hospital or ship—there was, in fact, no need for a helicopter ever to be empty.

As regards landing the aircraft back on the carrier, Lt-Col. McCutcheon said that no trouble had been experienced, the helicopters having been found more amenable to carrier work than fixed-wing aircraft. In conclusion, he mentioned that no special training or indoctrination had been found necessary for helicopter-borne troops. "In fact," he said, "we only use two words of command : Get in! . . . Get out!"

ICE-ISLAND AIRSTRIPS?

An Imminent U.S. Air Expedition, and the Phenomena it may Encounter

By FRANK ILLINGWORTH

THIRTY-FOUR American airmen and scientists are to spend the summer on an oceanographic survey of the Polar Basin—that is, the ice-jammed waters lying between the north coast of Siberia, Canada and Alaska. They recently left the naval air station at Patuxent River (Maryland) in three aircraft for the most northerly promontory in Alaska, Point Barrow, where there is a laboratory and airstrip.

The aircraft have been fitted with combination ski-wheel landing gear and they carry winches and hauling tackle so that they can extricate themselves in an emergency.

It is almost certain that landings will be made on the three sizeable ice islands which are known to revolve around the North Pole—and which could prove strategically important as advance bomber and interceptor bases, and as mid-way airfields on any future trans-polar civil air routes between North America and the Soviet Union.

The U.S.A.F. established a temporary meteorological camp on the ice-floes 200 miles north of Alaska last year. The Russians have maintained scientific stations on floating sea-ice for many months at a stretch—camps which were established from the air—and there is no doubt that the United States could maintain a *permanent* advance air base and met. and radar outpost on one of the three islands now known to be revolving around the Pole.

Authorities in America think it will prove easy enough to establish such advance outposts. At a conference in Washington last year, a member of the U.S. Naval Hydrographic Office, Mr. J. P. Allen, said that bulldozers and men could be parachuted onto the ice islands to flatten out landing-strips.

The first of the islands, known as T-1, was discovered on August 14th, 1946, by an aircraft of the U.S.A.F. Arctic Meteorological Flight. When flying through fog 300 miles north of Point Barrow the navigator located on his radar screen an island about 18 miles long by 16 miles wide. Appreciating the strategic value of even a small island in the Polar Basin, the U.S.A.F. diverted aircraft from Arctic patrol duties to follow up the discovery.

Because of continuing fog the search had to be conducted entirely by radar, from 17,000ft, and, although successive flights located T-1 without difficulty, each fix put the island a few miles to the east of the previous one. T-1 seemed to be moving! And indeed it was, for far from being an outrider to the mythical Crocker Land (the name applied last century to the Polar region then thought to be solid land) it was afloat and drifting around the Pole from Alaska in the general direction of the U.S.S.R.

When the fog finally lifted, T-1 appeared as a 300-square-mile oblong of ice, its cliffs towering to a height of 200ft—from which, on the principle that only one-eighth of floating ice appears above the water, its overall depth was put at 1,600ft.

The ice of the Polar Basin is normally of the "pack" variety (i.e., bergs), with "pans" up to 14ft in thickness, which, driven by wind and current, pile into contorted barriers sometimes 100ft above the sea. But T-1 bore no relation to "pack." From its colour and form it was obviously glacial ice—a gigantic berg broken from a glacier.

The "coastline" of Island T-1, with its 200ft ice-cliffs.

In 1946 the U.S.A.F. 58th Strategic Reconnaissance Squadron, under Lt-Col. J. Fletcher, was given the job of mapping the course of T-1, and the next three years saw the island carried 1,500 miles in the currents that sweep eastwards across the Pole and then back westwards along the coast of Canada and Alaska.

Next it was decided to discover if there were any more natural landing fields in the Polar Basin. In July 1951 the 58th Strategic Reconnaissance Squadron found an island, nearly half as big again as T-1; and a few days later a third island was discovered, shaped like a kidney, covering some 40 square miles, and situated between the Pole and the coast of Siberia.

Meanwhile, there were arguments about the origin of the ice islands. The theories were that (*a*), they dated from the last ice age and were therefore something more than 15,000 years old, and (*b*) that they were "broken-off ends of a glacier flowing into the Polar Basin."

The cameras of the 58th Squadron proved the latter theory to be the correct one. Flying along the coast of Ellesmereland (the island about the size of Britain lying off the extreme north-east of Canada), Lt-Col. Fletcher discovered a massive glacier: the outline of its "coast" matched the contours of T-2. In other words, this island—and, in all probability, the others, too—originated in this vast glacier, and, judging by the snail's pace at which the latter is moving into the sea, the oldest of the three islands must be at least 1,000 years old. From photographs it appears that they melt around the edges during the polar summer and make up their loss again in winter.

When last photographed, T-2 was resting at the North Pole; T-1 was aground off Ellesmere Island; and T-3 was drifting towards Siberia.

The three could bring about a novel situation in international politics. America claims unofficially "all territory between Alaska and the Pole," and the U.S.S.R. makes official claims on all territory between the Pole and the Soviet's Arctic coast. What, then, happens if an American-manned met. station and airfield drifts into the "Soviet sector" of the Arctic, or *vice versa*?

TURBO-CYCLONE PROGRESS

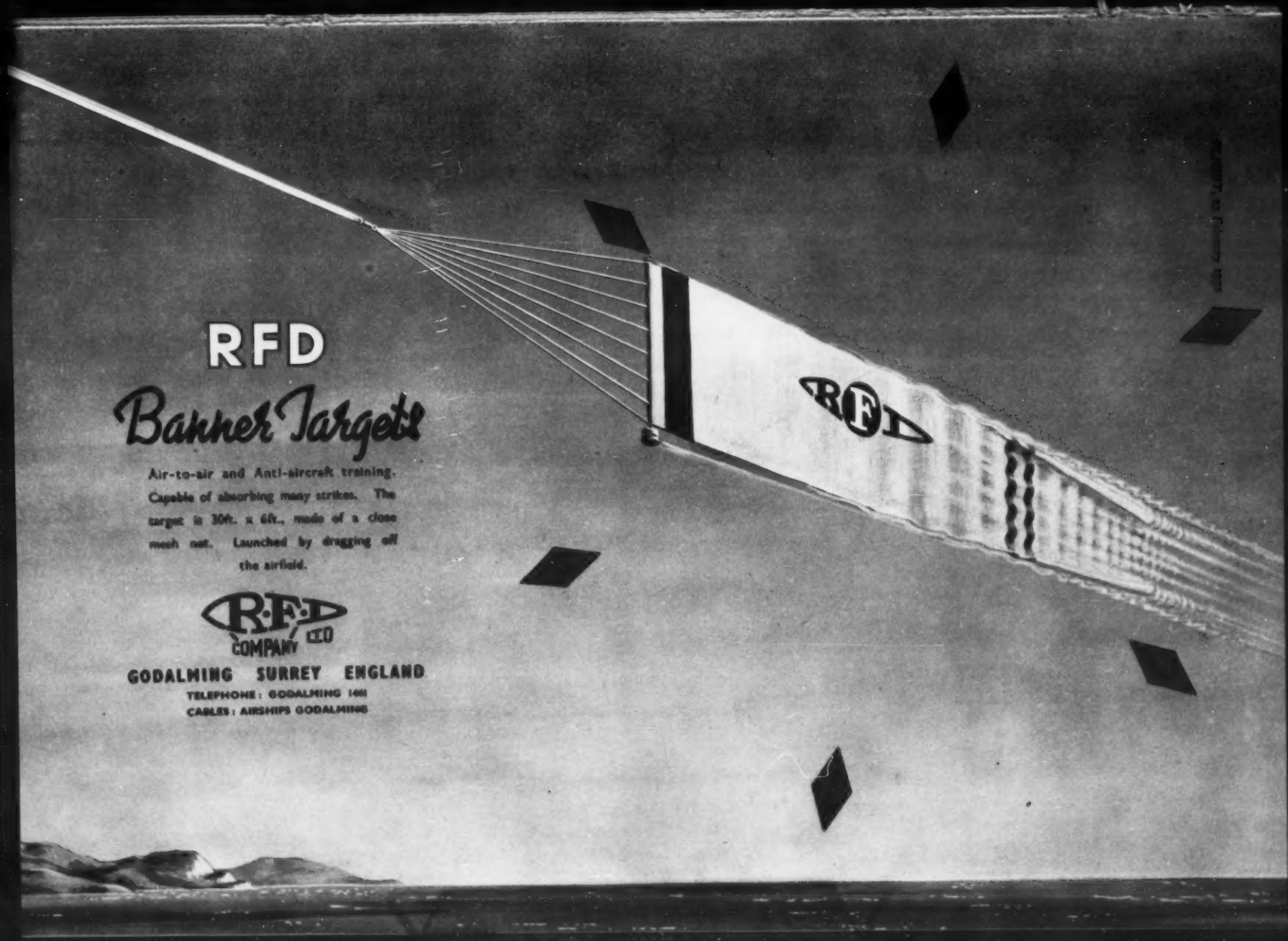
IT was Dr. H. R. Ricardo who pointed out that the piston engine was eminently suited to small volumes of working fluid at high temperature and pressure, while the gas turbine was better suited to deal with larger volumes at a lower temperature and pressure. Since the aircraft piston-engine produces an exhaust which, though approaching the permissible upper limit of temperature, lends itself to the operation of a gas turbine, a logical step was to couple the two systems.

The Wright Turbo Cyclone (described in *Flight* of July 27th, 1950) is a development of the familiar Cyclone 18, with three small "blow-down" turbines driven by the exhaust gas. The turbines are arranged at 120 deg. around the rear of the engine and are geared to the main crankshaft *via* a hydraulic coupling. There is thus no question of "turbo-supercharging" in the accepted sense.

The first aircraft to take the Turbo Cyclone was the Lockheed P2V-4 Neptune, although flight testing took place with an engine installed in the nose of a B-17 in October 1949. Reports of the performance of the engine in Neptunes indicate that there have been very few troubles; some sludging which had occurred in the hydraulic coupling of the turbine drive is now reported cured, while lowering the turbine inlet temperature to 950 deg F has resulted in an "indefinite" turbine life. One Neptune squadron has, in fact, been authorized to operate the Turbo Cyclone to 1,000 hours between overhauls.

Other installations of the engine include, among service aircraft, the later types of P2V Neptune, the R-70 Super Constellation naval transport, the C-121C U.S.A.F. Constellation, and the C-119H Packet, which is due to make its first flight shortly. Among civil types, the Turbo Cyclone is to be the standard power plant for the L-1049C Super Constellation and the Douglas DC-7, while there is a possibility of an installation in the Convair 340.

At present, Turbo Cyclones are being delivered only for military and naval aircraft, but the "compound Super Constellation" is due to go into production towards the end of this year.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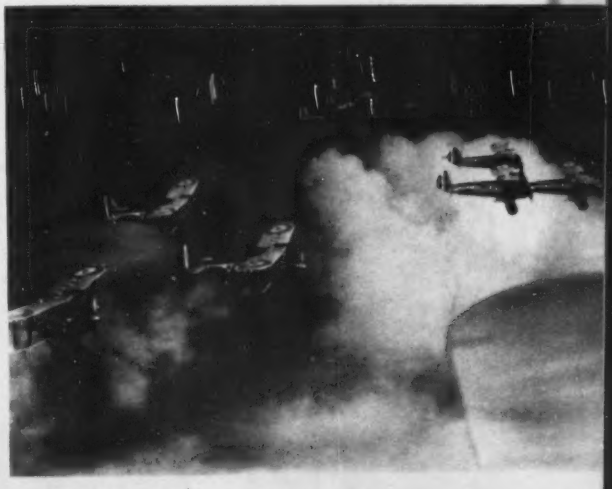
By
JOHN
YOXALL

Bulldog . . . . Gauntlet . . . . METEOR 8

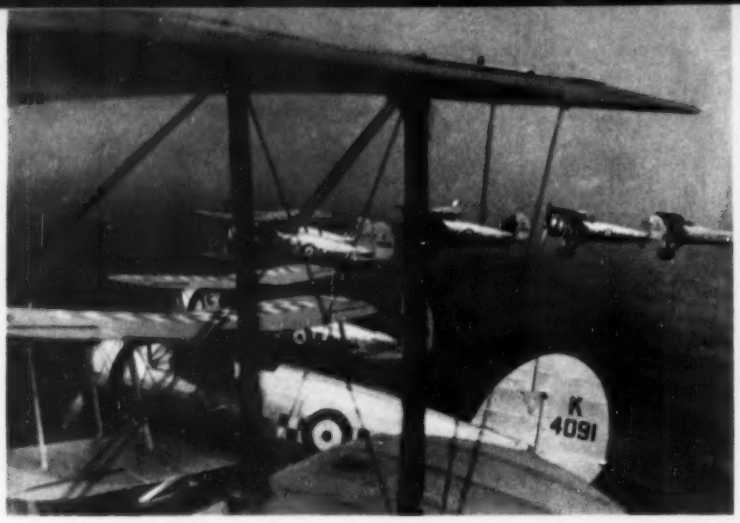
A Photographic Record of No. 19 Squadron Through Two Decades

THAT "They can because they think they can" is as true of No. 19 Squadron today as it was when their motto—of which this is a free translation—was evolved in the 1914-18 war. How often one hears today's squadrons compared adversely with the same units of past years! Such criticisms, of course, are seldom, if ever, valid; certainly they could never be made of No. 19's formation flying, as the comparative photographs published on these pages will testify. There was no cheating—a selection of air-to-air photographs obtained during pre-war visits was sent to the squadron with a request to have the formations repeated; and the challenge was immediately and enthusiastically accepted by the present commanding officer, S/L. B. L. Duckenfield, A.F.C., on behalf of his pilots.

It is now 20 years since I first visited them. They were then at Duxford, near Cambridge, and it was a Cambridge University Air Squadron Atlas which was borrowed in order to obtain photographs of their Bristol Bulldogs in various formations—a novelty in those days. In the early nineteen-thirties the R.A.F. was still trying to rival the Navy as a silent service. No visits by the Press to describe and photograph the squadrons had been granted during the long period in which Marshal of the Royal Air Force Lord ("Boom")



Twenty years apart: No. 19 Squadron in squadron formation on (above) Meteor 8s in 1952 and (right) Bristol Bulldogs in 1932. S/L. Duckenfield, A.F.C., led the Meteors and S/L. A. C. Sanderson, D.F.C., the Bulldogs.



Bulldog... Gauntlet... METEOR 8

Trenchard was Chief of the Air Staff. The embargo was lifted in 1930.

The next visit was three years later, when No. 19 had been re-equipped with Gloster Gauntlets, which they kept until they were given Spitfires in 1938. As with the Bulldogs, photographing the Gauntlets was novel in itself. One of the very few two-seater Bulldogs was obtained and I flew as the ninth member of the squadron. If memory serves, this was a very cramped and draughty trip.

Then came the war : "security" frowned on courtesy visits to fighting units and prohibited the mention of their identification and location.

To become one of the squadron again in this most recent visit, I was put into the front seat of a Meteor 7 with Sgt. Mercer as a very considerate and skilful back-seat driver. As a passenger one feels very detached in the nose of the Meteor 7—the wing seems so remote. The feeling is almost akin to that which one had in the front seat of the old Blackburn Kangaroo of 1917, where an effort of mind was required to bring conviction that the rest of the aircraft belonged to the bit in which one was flying.

No longer could there be a squadron formation take-off, as in the days of Bulldogs and Gauntlets, but the Meteor 8s did get away in sections of three—with considerable despatch,

ABOVE are comparative Squadron Vic formations of Gloster Gauntlets, 1935 (S/L. J. R. Cassidy), and the present-day Meteor 8s. On the right is a glimpse, through the C.O.'s office window, of Meteors being prepared for the day's flying ; and a portrait of Sgt. Mercer, who piloted the photographic Meteor 7 from the back seat. On the left is No. 19 Squadron lined up on the tarmac. The pilots' names, left to right, are:— P/O. B. M. Harnett, P/O. A. Goodby, Sgt. R. M. Scott, Sgt. J. Mercer, F/O. A. Shepherd, F/O. L. W. Phipps, F/O. J. A. Harrison, F/L. F. A. Partridge, S/L. B L. Duckenfield, A.F.C., F/L. C. R. G. Neville, Sgt. H. Marlow, Sgt. J. Coutts and Sgt. D. Taylor.

Bulldog . . . .

Gauntlet . . . .

METEOR 8

Another comparative pair of photographs, this time showing the squadron Gauntlets and Meteors in Flight Line Astern. The extra span of the Meteors, although only three feet, made it necessary for the photographing aircraft to fall back just a trifle in order to include the rear section leader.

as we found while taxying through their slipstream to take off immediately afterwards.

In the air, the present-day pilot has the great advantage of intercom and R/T. to aid in building up a perfect formation. On the other hand, throttle response is much slower with turbojets than it was with Bristol Jupiter and Mercury radials. The most useful "station-keepers" on the Meteor are, of course, the air brakes.

But all this is really beside the point : from the photographs it is quite clear that No. 19 Squadron is as good as ever it was —and was as good as it is now.

No. 19 Squadron was formed in September, 1915, at Castle Bromwich and went to France in July of the following year, equipped with B.E.12s. In October, 1916, it was re-equipped with Spads and did much air-fighting and contact-patrol (Tac.R) work with them until Sopwith Dolphins were issued in 1918. A dolphin was incorporated in the badge and remains part of the official design. At the end of the First World War, during which they claimed 145 enemy aircraft destroyed, the unit was disbanded.

In 1923 it was re-formed at Duxford as a training flight and in the following year brought up to strength as a fighter squadron and issued with Gloster Grebes. Duxford remained the squadron's home until 1938, but the equipment changed first to Bristol Bulldogs, then to Gloster Gauntlets, and for the Battle of Britain it had various marks of Supermarine Spitfires.

From 1941 to 1943, with Spitfire VBs and 22s, the unit was engaged on fighter sweeps, interceptions and convoy patrols. The score of enemy aircraft destroyed reached the century mark in 1943. The next year, 1944, saw a change of rôle to Tac.R. Mustangs were issued and No. 19 joined 2nd T.A.F. at Bayeaux. This work lasted but a short while, and in 1945 they were back in England doing long-range escort work with daylight bombing raids.

There was another change in 1946. The squadron reverted to Spitfires, but again this was only for a year. In 1947 D.H. Hornets were taken on charge and No. 19 became a day-intruder fighter unit.

Last year the Hornets were changed for Meteors and the squadron again reverted to its interceptor fighter rôle. It is one of the units which recently qualified for the King's Standard.

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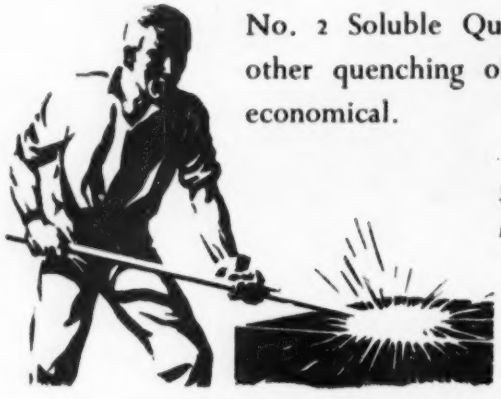

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The Brancker Memorial Lecture: Sir Frederick Bowhill Makes An Outspoken Criticism of Official Policy

The modern concept of a civil flying-boat is seen in the Saunders-Roe Duchess which, with six Ghost turbojets, is designed to fly at 500 m.p.h. at 40,000ft carrying 74 passengers.

THE FLYING-BOAT'S MARTYRDOM

IN his paper, *The Flying-boat and its Place in Aviation*, given before the Institute of Transport on February 11th, as the tenth Brancker Memorial Lecture, Air Chief Marshal Sir Frederick Bowhill, G.B.E., K.C.B., C.M.G., D.S.O., chose a subject which, we regret to say, is not popular with those who are vested with the authority of operating this country's air commerce. But Sir Frederick is the Chief Aeronautical Adviser to the Ministry of Civil Aviation, and we find it difficult to credit that anyone with such a background and in such a position can speak so trenchantly on a subject, no matter how transiently unpopular, and continue to be disregarded. We firmly believe that the flying-boat will come back into its own sooner or later, and can but hope, with Sir Frederick, that for the want of courageous far-sightedness in high places the renaissance may not be dangerously long delayed.

In introducing his lecture, Sir Frederick said that he knew he had been called "a voice crying in the wilderness," but he was seriously alarmed at the modern trend of thought in certain quarters which seemed to be to eliminate the flying-boat and to throw away all the knowledge which had been built up during many hard and strenuous years. To lose this valuable experience was nothing more nor less than a tragedy.

From a passenger and freight point of view, Sir Frederick thought that the long-distance aeroplane, if it was to pay its way, must become larger and larger, which, in broad terms, meant more land, stronger runways, etc., and thus more expense. In many parts of the world land was now very valuable, more especially in view of the increase in population, and the vital necessity to use every productive acre to alleviate the food problem.

Forerunner of a long line of magnificent aircraft, the C-class boats built by Short Brothers gave unrivalled service over the Empire Routes.

It therefore followed that the more we could use the sea, the estuaries and the rivers, the better. The Chief of the Air Staff had said that one of the main headaches of the rearmament programme of the United Kingdom was the matter of aerodromes.

There was the oft-quoted argument that good flying-boat bases were difficult to find even in the British Isles, and in support of this view reference was sometimes made to that excellent Report of the Flying-boat Base Committee of 1947, of which the chairman was Lord Pakenham. There was one paragraph of that report to which Sir Frederick wished to draw particular attention, because he so often found that it was taken as a matter of course that, although all facilities had to be provided for land aircraft, makeshift arrangements would do for flying-boats. He therefore quoted "that the commercial flying-boat must be able to command in every respect equal efficiency in its terminal facilities to that accorded to the landplane. This applies to operational aids and to traffic-handling amenities."

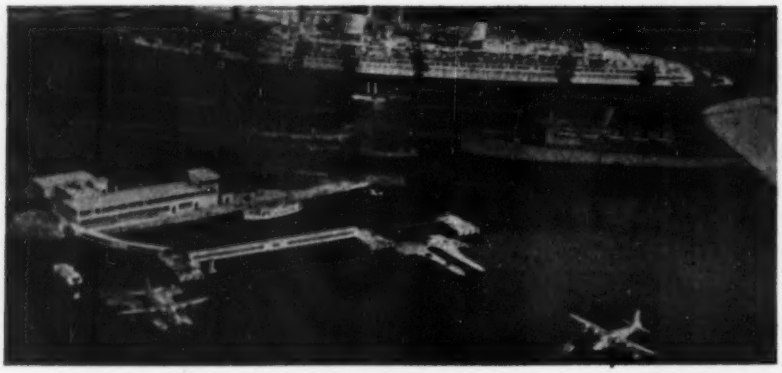
The committee were asked to "select a single site for a flying-boat base," and this led to the principle that reasonable proximity to London had to govern their search. As would be remembered, their final choice was Langstone Harbour, and a most excellent base it would have made, at quite reasonable cost when compared with the cost of large aerodromes suitable for the large modern land aircraft.

Affinity with Shipping

Sir Frederick was of the opinion that the flying-boat should increase in size to well above that of the Princesses and that, as regards bases, they should be treated in the same manner as ships. No one expected ships, which were the lifeline of the British Empire, not to have complete facilities in the form of navigational aids, docks, warehouses, dry docks, etc., and we ought to regard the big flying-boat on the same lines.

He suggested that the number of big international aerodromes which were required in the United Kingdom had to be kept down to strict limits, and he would make that limit four. In the same way, marine-aircraft bases would also be kept down. Where possible, the big flying-boat bases should be connected with the big shipping ports, such as London, Southampton, Liverpool and the Clyde. In fact, suggested Sir Frederick, they should be looked upon in a somewhat different light from that of past thinking. Passengers and freight would arrive and be taken away by helicopter, light aeroplane, train or road. If we so looked upon them, we should find sites and facilities much easier to obtain. Rivers and estuaries could be used for landing and taking off, and this would also help to alleviate the noise nuisance. Sir Frederick said that he had talked about flying-boat bases only in the British Isles, but if the problem was fairly faced, keeping closely in mind the analogy of shipping, he felt certain that there would be little difficulty in finding suitable bases in other parts of the world.

Turning to the commercial aspects of the flying-boat, Sir Frederick posed the question: "Can we learn from the past whether the flying-boat has a commercial future?" This type of aircraft was first taken into substantial use by British air services



A post-war innovation which was brought to nought by policy decisions—the B.O.A.C. marine aircraft terminal at Southampton is here seen with the "Queen Elizabeth" in the background.

THE FLYING-BOAT'S MARTYRDOM . . .

in 1931, and the introduction of the Empire Air Mail Scheme in 1937-38 gave an impetus to the use of the flying-boat. It was of interest to look at the Air Ministry's view in 1934, and the reasons why they proposed to use flying-boats on the majority of the Empire Air Mail services: (i) The flying-boat gave greater security over long stretches of water, whilst facilitating the comfort of passengers and promoting economy of fuel costs. (ii) It would avoid heavy costs in the maintenance of runways along the routes. (iii) Only a flying-boat service would meet the declared wish of the Union government to see Imperial Airways operating a coastwise service to Durban. And another factor might have been that difficulties may have been encountered in obtaining landing grounds in certain European and Middle East countries.

The position of flying-boats was reviewed again early in 1948, and the very broad points put forward against the type were, firstly, the flying-boat had lagged behind the aeroplane in development and was thus less economical than the equivalent type of landplane (in other words, the flying-boat of 1937/38 was being compared with that of the modern landplane of 1948); and, secondly, the expense of supplying flying-boat bases, other nations having abandoned the civil flying-boat; the British Government would thus have to bear the full cost of marine bases abroad required for any British use. It then came up for consideration as to whether the Princesses should be abandoned, but the Government of the day decided that they should not.

It would be remembered that British South American Airways came to the conclusion that they could operate the Princess satisfactorily on their two major routes, and that there were in existence along the Corporation's routes strategically placed natural marine bases capable of more economical operation than those on the Empire routes. But some time after the merger of B.S.A.A. with B.O.A.C. the projected use of the Princess on these routes was abandoned.

Economic Arguments

Under the heading "Economics," Sir Frederick said that the arguments which were frequently produced against the flying-boat could be put into three broad categories: (i) The supposed uneconomic nature of the vehicle; (ii) the cost of marine bases; and (iii) the burden of parallel organizations.

So far as the first of these was concerned, he could not do better than refer to those very able lectures, one by Peter Masefield, given before the Institute of the Aeronautical Sciences in New York, on January 30th, 1947, and the other by D. Keith-Lucas, of Short Brothers and Harland, Ltd., given before the Anglo-American Aeronautical Congress in New York on May 26th, 1949.

On the score of (ii), the cost of marine bases, Sir Frederick said that from an analysis he had made with the help of experts of the M.C.A., he had found that the cost of the flying-boat base was less than that of the land aerodrome. London Airport at present covered 2,827 acres of valuable agricultural land. The following broad factors were therefore involved:—

For land bases:—

(*a*) Land had to be purchased (and compensation paid for the actual aerodromes).

(*b*) Heavy runways had to be built.

(*c*) Land had to be purchased for maintenance and administration buildings, also for the area required for parking, handling, loading, etc., and the buildings and hangars had to be built.

(*d*) All control, approach and radar aids had to be supplied.

(*e*) The noise factor had to be faced, and steps taken to alleviate it.

How did these factors affect the flying-boat base?

(*a*) Not required.

(*b*) Not required, but against this a certain amount of dredging might have to be done, but even this might nearly pay for itself by reclamation of land. Sir Frederick then referred to the argument that there was the ever-present possibility of damage by floating debris to the delicate hulls of flying-boats during landing and take-off. He cited the Medway at Rochester—a busy, narrow river if ever there was one—hemmed in by tall chimneys and buildings and carrying a full quota of driftwood, flotsam and jetsam common to rivers of this nature, and yet used by water-borne aircraft for 30 years. There was no recorded instance during that time of damage to an aircraft through collision, or the striking of a floating object. If people brought these arguments forward, then, in fairness, they should quote the bursting of tyres, ground loops, and belly landings caused through undercarriage failures of landplanes.

(*c*) This also applied in a general way to the flying boat base, and in addition, the cost of a slipway and the means to get big boats in and out of the water had to be provided. But beaching should be a rare occurrence, because he believed that the proper answer was a floating dock in the form of bays formed by pontoons, to facilitate fuelling, loading, unloading, engine changes, etc. These pontoons could easily be constructed, and could also be made to ensure easy transport. Sir Frederick asked his audience not to forget what had been done with a design such as the Bailey bridge, and said that it was on these lines that he was thinking.

(*d*) This applied to the flying-boat base as well.

(*e*) This was becoming a serious menace, and was under intensive study by the M.C.A. Even at present (and Sir Frederick was afraid that the situation would get worse with the advent of turbojet airliners), within one or two miles of London Airport conversation was apt to be impossible with windows open, about once in every 20 minutes—and the objective of the M.C.A. was to increase the landing rate to one in every three minutes. Sir Frederick emphasized that he was referring to people living on the

"Flight" photograph

Another fine post-war innovation brought to nought by policy decisions, the Short Shetland was a wonderful aircraft by any standards.

line of the two main runways. It also appeared that the annoyance caused by jets was out of proportion to the actual noise they made, but that might only be a passing phase. On the other hand, big flying-boats, owing to the position of their bases, should rarely find it necessary to fly low over thickly populated areas.

Sir Frederick gave it as his opinion that (iii), the burden of parallel organizations, was exaggerated, because he thought we were only touching the fringe of civil aviation, and there would be a great increase not only in passenger, but in freight traffic. He suggested it was a short-sighted policy to think otherwise. Many people had thought it would be impossible to have the number of motor cars we had on our roads today and, what was more important, the number of motor vehicles transporting goods to and from our factories and ports. He quoted Sir William Hildred in stating that "the post-war history of the air transport industry showed that 1948 was a period of considerable expansion in traffic, and showed significant gains over 1947. In 1949, while traffic continued to mount, the rate of increase, for various reasons, slowed down. But the 1950 figures belied and confounded all expectation."

Sir Frederick said that he fully realised that the majority of States did not operate flying-boats, and had declined, at least for the present, to provide marine bases at their own expense. Once they saw the possibilities of the flying-boat, and the work it was doing, they would, he felt, change their policy in this respect.

The British flying-boat was still used in many parts of the world, and this was indeed high praise considering how long ago they were designed. With the exception of the Short Sealand amphibian, there was no new British flying-boat actually flying, and this, in his opinion, was a sad story of short-sighted policy and neglect. We ought to have had a gradual replacement of the old types by bigger and newer types (in this respect the Shetland would have been ideal; she was a new aircraft with no snags, which was practically unique in the annals of aviation, and could have gone into production at once) up to the Princesses and thence to still bigger and better types.

Present Boat Operators

The British flying-boats still in use were operated by the following companies: Tasman Airways, Trans-Oceanic Airways, Argentine Airlines, Causa, and Qantas. In addition, the Sealand was also being used by different nationalities in various parts of the world. But only one company (Aquila) used flying-boats based in the U.K., and this bold action deserved all possible encouragement, which, Sir Frederick was glad to say, was forthcoming (so far as it could be done constitutionally) from the Ministry of Civil Aviation. When he asked the company why they used flying-boats, their answer was illuminating, and was based on two factors: basic economy, and what the passenger wanted.

When considering the operational cost of a landplane against a flying-boat, all costs had to be taken into account regardless of by whom they were paid. Under the present British regulations, a landplane operator and a flying-boat operator both had the same operating expenses, but Sir Frederick did not believe that the maintenance costs of a flying-boat were greater than those of an equivalent landplane. This was particularly the case with increase in size, where the complicated landing gear had its own very particular servicing problems, quite apart from the spares costs, particularly in tyres. Against this, the flying-boat had to be washed down and re-lanolined periodically, whilst at some major overhauls, such as that for the C. of A., some re-plating might be required; this, however, was not difficult. The main difficulty in operating expenses arose from the subsidy paid by the taxpayer to the landplane operator in the form of airfield facilities. It was the indirect subsidy of the airfield facilities which made the landplane such an attractive economic proposition from the viewpoint of the operator.

On the subject of what the passenger wanted, there was little more to say, but it did seem strange that the fare-paying public should not get what it required. There was ample evidence to show the great preference for flying-boats from the very heavy bookings on the Solent services to South Africa when operated by B.O.A.C. Any booking clerk could tell one that the preference, except in a few isolated instances where speed was an important factor, was for the Solent. But Sir Frederick emphasized that a modern-designed flying-boat could be equally as fast as the modern-designed landplane.

The fact that this preference had been shown for flying-boats over an inland route was indeed remarkable. If a flying-boat was preferred over the land, surely it was given even greater preference when crossing the ocean. Passengers were still, on the whole, nervous people, and he was convinced that for ocean crossings they would have far more confidence in a flying-boat which they believed could alight in an emergency anywhere along the route. Sir Frederick cited the case of the *Bermuda Queen*, which ran out of fuel in a heavy gale when crossing the Atlantic and landed alongside a weather ship, stayed afloat for 36 hours, and had every one of its 66 passengers and crew of nine rescued without harm. Had the same thing happened with a landplane, it was quite obvious that any hope of rescue at all would have been out of the question. Sir Frederick, as a former C.-in-C. Coastal Command, was fully aware of the number of Sunderlands which, during the war, not only safely landed in the Atlantic under appalling conditions, but also took off.

Here seen on the apron at East Cowes, the first of the Princess giant flying-boats is now well on the way to completion.

It should be remembered that the performance of the Princess would be severely handicapped as the aircraft would be underpowered with Proteus 2 engines. It was a great pity that there would apparently be a delay in putting the Proteus 3 into the other two Princesses because, with these power units, they would show their real performance. Sir Frederick thought that the turbojet held out great advantage for the flying-boat because it did away with the many problems which arose when aircrews were used, and thus gave a much freer hand to the designer. The old cry against the flying-boat that it was slow compared with the landplane no longer applied: there was not the slightest doubt that the large, modern flying-boat could be every bit as fast as the large modern landplane.

Lord Brabazon's Views

It had been asked, "Why, if the flying-boat had a future, was it not included in the various classes which were the outcome of the Brabazon Committee Report?" The answer to this question was given by Lord Brabazon himself, in his preface to that excellent book, *Wings for Tomorrow*, where he says: "Speaking on behalf of the great Brabazon Committee, I have always felt a little guilty that we did not see our way to recommend the building of new 'boats.' I have also been surprised, considering the popularity of flying-boats, that the Committee was not vigorously attacked for its sins of omission. The facts are, however, that we did all we could, but our terms of reference were to express 'users' requirements' as to future types, and at the time we could not get those in charge of the operation of fleets of aircraft to demand them. I thought then it was a mistake; I am sure of it now."

Our sea power, as we all knew, was based on the strength not only on the Royal Navy, but also that of our Merchant Navy. So, as the use of the air expanded (as it certainly would), must the same principle apply to air power, i.e. on the strength not only of the Royal Air Force, but also that of the Civil Merchant Fleet. In peace, we had to prepare for war. In preparing for war, transport was a vital factor, and to have an air vehicle which need not depend on runways or strips, but which could use the sea, rivers or estuaries, would, in certain cases of enemy activity, be of the greatest value. Because of this alone, Sir Frederick argued that a proportion of our air transport should most certainly be flying-boats.

Another great war factor—and this applied also to a certain extent in peace—was the ability to produce aircraft quickly and, therefore, surely we should keep alive and in being every firm which had mastered the art of building aircraft. There were only two firms in the United Kingdom which had mastered that art, so far as flying-boats were concerned: Short Brothers and Harland, Ltd. (which, alas, with the exception of the Sealand, was no longer building flying-boats), and Saunders-Roe, Ltd.

Sir Frederick concluded his lecture with the statement that, in his opinion, we were going full speed ahead to "kill" the flying-boat. This was a tragedy, and he could foresee that, in a few years' time, when the art had been lost, and when the teams of flying-boat designers had been scattered to the four winds, the nation would wake up to the need for them.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Production and Manpower

THERE is a flaw in the solution to the manpower problem offered by "Pedantica" in his letter published on January 18th.

The individuals described in his penultimate paragraph will never be worth £10 per week in an industry dependent, wholly or partially, on the labours of its operatives for survival.

Those who instinctively seek their vocation on the "principle of least work" are a source of drag on society and cannot be considered for the undoubted honour of taking part in the creation of masterpieces like the Comet and the Canberra.

No, sir, this character will solve NO manpower problem.

Edinburgh 10. K. G. McAINSH.

New Forest Airfield

AS one who was O.C. (or Instructor) of the R.F.C. station at Beaulieu, I can confirm that the site of the airfield and of the New Forest Flying School were on the south-east corner of the area.

Capt. Lamplugh (Correspondence, January 18th) is correct in his statement that it lay to the south-east and not the north-west of the existing Beaulieu-Lymington Road.

Byfleet, Surrey. H. A. WESTENDARP.

The 1910 Coanda Turbine

MR. BILLING'S letter on the Coanda biplane, published in your issue of January 11th, is of interest to me, as in 1944, shortly after the liberation of Paris, I had the pleasure of several hours' conversation with M. Coanda himself, in that city.

The discussion primarily concerned the so-called "Coanda Effect," but the biplane was also mentioned and I can definitely confirm that the power unit was of the ducted-fan type, similar in basic principles to the Caproni-Campini aircraft of the 1930s.

I asked M. Coanda if he ever flew in the biplane and to the best of my recollection his reply was : "Those were the days when one knelt on the ground to see if the wheels left the earth, but I believe I took off for a few feet and then came down hurriedly and broke two teeth."

Coventry. J. W. ADDERLEY.

C.G.G. Adds Some Postscripts

AS I have been dragged by name (Correspondence, February 8th) into the discussion about Capt. Bertram Dickson's crash at Lanark on August 8th, 1910, and as I represented *The Aero*, of the House of Iliffe, at the time, and was the passenger concerned in what was the first passenger flight and the first crash in Scotland, perhaps I may be allowed to poach on your preserves.

Dickson—who was a gunner, and the first British Army officer to take a ticket (No. 71, in France, May 10th, 1910)—brought his Farman biplane to Lanark (see *The Aero*, August 17th, 1910)—where a "galaxy" of aviation talent was assembled. On the Monday he asked me to go with him for the passenger prize (weight-lifting). Together we weighed 25 stone 4 lb, of which he contributed about 10½. He wanted to carry more than 180 kg, so he told the official weight-adjuster to put on another three stone—in the form of lead strip wrapped round the undercarriage struts.

I learned after the meeting that the official had put on 42 kg (or nearly seven stone) of lead, instead of 42 lb (three stone). So the take-off, with some 30 stone of added weight was, as the French say, "emotioning."

We *did* get off, and flew gaily out over the Clyde Valley, where we got into a down-draught which—when we turned, dropping steadily, and tried to climb back on to the racecourse acting as the aerodrome—planted us firmly on to the hillside with two wheels and the left skid in a ditch. But we walked home. Dickson, I remember, did not get down from the machine; he merely stood up, as his feet, on the rudder-bar, were also on the ground. I was pleased that the Gnôme engine did not hit me in the back.

Your correspondents Messrs. Solomon and Kappey (to whom my compliments) will remember that they and others rebuilt the machine and had it flying two days later—how people *worked* in those days!

The whole story of Bertram Dickson's (ultimately) fatal accident at Milan will be found on p. 293 of *The Aero* of October 12th, 1910, with a photograph of him. He was such a good chap.

On the same page is a curiosity—a photograph of the first, and I think only, aeroplane built in Ireland, with its first passenger, and its builder, a Belfast cycle-dealer by name Harry Ferguson—now a tractor-millionaire who is able to take on the Ford Company in a legal action. The number of pioneers of 40-odd years ago who survive is amazing.

Capt. Bertram Dickson on his Farman biplane—a "Flight" photograph taken a few weeks before the Lanark meeting referred to below.

Perhaps you will also allow me to add postscripts to two other historical references in recent issues of *Flight*—on the 1929 Piaggio Schneider Cup seaplane (page 129, February 1st) and the Bristol-Burney seaplane (page 181, February 15th).

In the very early days, Lt. Guidoni of the Italian Navy (later General in the Italian Air Force, and killed by a badly—some said purposely badly—packed parachute at the gates of what is now Guidonia, the Italian Farnborough) patented the Guidoni palettes, little hydroplanes stuck under cylindrical floats under a Farman Box-kite. The palettes raised the floats off the water and the machine flew, but the palettes set up an awful drag.

The thing was flown by Lt. Savoia (no relation to the Savoia aircraft) who was later air attaché in Washington and in Paris in Mussolini's time.

The idea pleased young Lt. Dennistoun Burney, R.N. (son of Admiral Burney), so he persuaded the Bristol Co. to build him the "water-walking" monoplane you have described. It was sent down to Pembroke Dock, with Harry Busteed (an Australian who came over with Harry Hawker, learned to fly at Sopwith's at Brooklands, later joined the R.N.A.S., and eventually became a group captain, R.A.F., and commanded a balloon-barrage in 1940) in charge, along with Bentley Daere, also R.N. As John Taylor says in his article, it rose all right when towed, but when they tried it with the engine, and Busteed tried to clutch-in the airscrew, it sank before the screw could take charge. The screw thrashed the water, and the whole thing turned over.

Harry, who swam like a seal, was up in a moment, but Daere was fished out full of water. (I sat next to him at the 1950 R.A.F. Dinner Club dinner, and heard a lot that I didn't know before.) When he was carried ashore the docksiders thought he was drowned and all stood with their caps off (much to his joy, at being a saluted corpse) as he was carried to the hospital.

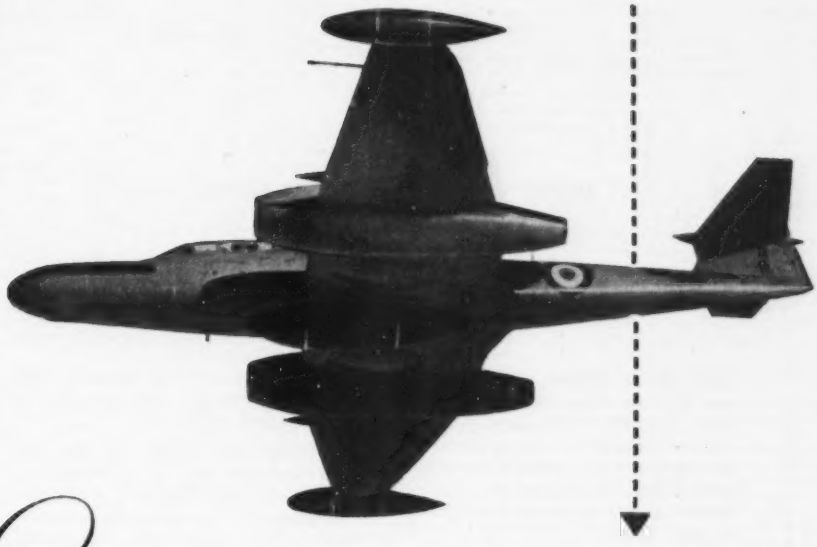
The palette monoplane was scrapped, but then came the joke. When Burney was serving in the Navy in 1914-15 he bethought himself of the funny things the palettes used to do, and from them he designed (or invented, if you like) the famous "hydrovanes". [Later known, we believe, as "paravanes"—Ed.] One was towed under water on each side of the bow of a ship. If the ship was about to hit a mine the cable of one or other hydrovane caught the mine-cable and, with some gadget attached, sawed it through and set the mine adrift, so that it could be exploded by gunfire.

The hydrovanes in fact saved hundreds of ships and Burney was awarded a colossal sum—£400,000, I think—and was set up for life. Just for fun he had a lovely car built for himself, with the engine behind the back axle. [More than one was built.—Ed.]

But, partly with his money, and partly with that of Vickers-Armstrongs, Ltd., he designed and built the world's best airship—the R.100, which flew to Canada and back. She was then, after the disaster to the Government-built R.101, condemned by the jealous scientists, taken to pieces in her shed and rolled flat by steam-rollers, for scrap.

The actual designer was B. N. Wallis, and the construction was all geodetic, like that of his Wellingtons of a few years later. The engineer in charge was Nevil Shute Norway, later of Airspeed, Ltd., and most famous as the author of *No Highway*.

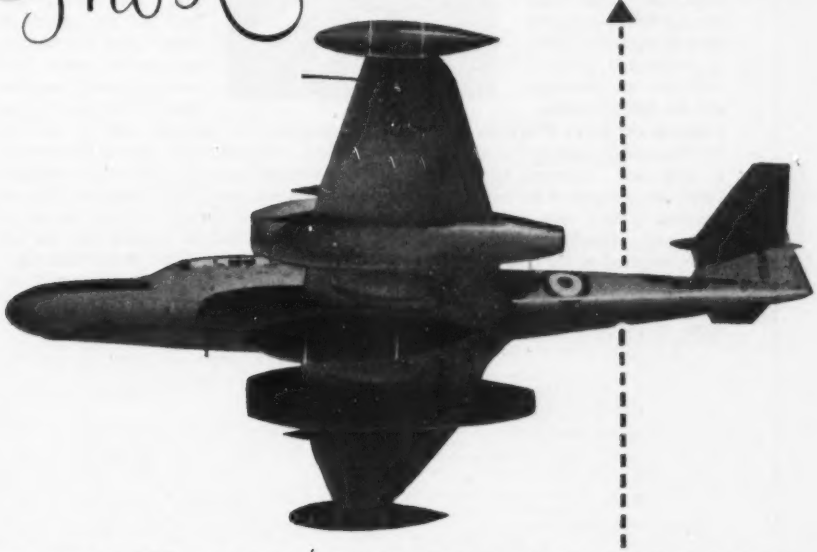
The Royal Aero Club. C. G. GREY.



4 Gun Ghost

Streaking through the night skies like an avenging spectre, the Armstrong Whitworth N.F.11 tracks hostile planes with quick, all-seeing radar eyes. Given extra endurance by wing tip and ventral fuel tanks, armed with 4 deadly 20 mm. cannon, the lethal N.F.11 is in full production for the R.A.F., as a basic weapon in Western European night defence. Pilots say that the N.F.11, on pursuit or interception, flies faster, climbs higher, hits harder than any other known night fighter.

ARMSTRONG WHITWORTH **N.F.11**



SIR W. G. ARMSTRONG WHITWORTH AIRCRAFT LIMITED, BAGINTON, COVENTRY, ENGLAND

MEMBER OF THE HAWKER SIDDELEY GROUP
PIONEER...AND WORLD LEADER IN AVIATION

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BEA

BRITISH EUROPEAN AIRWAYS

CORRESPONDENCE . . .

Scandinavian Dragon

RECENT references to the name *Draken* as applied to the Saab-210 Delta, and to whether it should be translated as "Dragon" or "Kite," led me to consult my dictionaries.

Wenström (English-Swedish) gives the following definition: "Kite: (1) (zool.) *Glada*; (2) *Pappersdrake*." The second word means "paper dragon" and refers to the article which small boys fly on the end of a string. My wife tells me this is contracted to *drake* as a colloquialism. For Dragon, Wenström gives *Drake*.

Wenström and Harlock (Swedish-English school edition—probably the best authority published) gives *Drake*=Dragon. N.B.: *En Drake*=A Dragon. *Draken*=The Dragon (article is attached to end of noun).

From this, I should judge that your subsequent amendment to the original translation was unnecessary.

The people who chose the name, of course, are the only ones who could make clear what was intended, but I should think it is unlikely that they would give their aircraft a name which could be translated into something no more impressive than "kite."

Hucclecote, Glos. R. W. WALKER.

Mixing the Masters

APROPOS Douglas-Commercial (DC) aircraft designations, may an old Santa Monican point out that your correspondent J. M. N. Hudson (February 1st) is himself adding confusion to the confounded in seeing a DC that died on the drawing-board—to wit, the DC-8. While I believe it is true that the commercial version of the C-74 Globemaster I military transport was originally classified as the DC-7, it is incorrect to assume that the mythical DC-8 had any physical affinity with the Douglas XB-42 ("Mixmaster") tail-screw bomber, built and flown for the U.S.A.F.

The two designs were, in fact, quite distinct although, admittedly, the basic design philosophy of the XB-42's fully submerged power-plant and remote-drive pusher screws inspired the general layout of the DC-8. But whereas the XB-42 was a highly ingenious and promising military prototype, the DC-8 was only an airline "paper proposal" that fell by the wayside, possibly because its remote propeller drive was just a bit too remote for the orthodox airline engineer to swallow.

That the same design-formula—albeit with less remoteness between engine and airscrew—could be successfully applied to a commercial transport was later proved by Douglas in the Cloudster executive model. This small twin performed nicely in the air, but finished up in the financial clouds. The type-number collectors can now argue whether a DC-10 label was reserved for the Cloudster, seeing that DC-9 (the intended DC-3 post-war replacement) was already charged out to another mythical airline proposal that fell on stony soil.

Incidentally, I believe that the "Mixmaster" tag was more in the nature of company colloquialism for the XB-42, following its fancied resemblance (at least at the tail end!) to that universal American drug-store installation, the malted-milk churner.

Cheltenham, Glos. FAVONIUS.

WITH reference to Mr. J. M. N. Hudson's letter pointing out that the previous designation DC-7 applied to the commercial version of the C-74 Globemaster I military transport (ordered by the U.S.A.F. in 1942, but the prototype did not fly until September 1945), there seems to be a reasonable enough explanation.

In 1945 P.A.A. placed a provisional order for "up to 26" DC-7s based on the assumption the cost per unit would be approximately one million dollars; however, with the coming of V.J. day, Douglas military contracts for the C-74 were slashed from about 100 to 14, compelling the manufacturers to increase their price for the airline version to almost $2 million each! P.A.A. promptly cancelled their provisional contract and turned to Boeing, deciding in favour of the Stratocruiser instead. Thus, since there were never any commercial versions of the Globemaster I built, the designation DC-7 was dropped by Douglas.

Mr. Hudson is incorrect in stating Douglas allocated the designation DC-8 to the unorthodox XB-42 and XB-42A "Mixmaster" light bomber. In fact, the DC-8 never got beyond the project stage back in 1947, and although its power-plant layout was intended to be based on the XB-42, there similarity ends. Yet another "Douglas Commercial" never got beyond the project stage—the DC-9, a twin-engined low-wing transport with specification similar to the Convair 340.

Prestwick, Ayrshire. DENNIS M. POWELL.

FORTHCOMING EVENTS

This week we include the full summer programme of rallies and other events so far notified, and as quoted in the current issue of "The Royal Aero Club Gazette." Organizers will assist us—and themselves—if they will notify additions and amendments.

Feb. 22. Institute of Navigation: "Navigation Aids for Military Aircraft," by S/L. D. Bower.
Feb. 22. Helicopter Association: "Helicopter Power Plants," by A. Graham Forsyth, B.Sc., F.R.Ae.S.
Feb. 23. Society of Licensed Aircraft Engineers: Main Lecture: "Some of the Responsibilities and Problems of an Airworthiness Authority," by R. E. Hardingham, O.B.E., F.R.Ae.S., M.S.L.A.E.
Feb. 26. R.Ae.C.: Courtenay Film Show.
Feb. 26. R.Ae.S. Graduates' and Students' Lecture: Gliding and Meteorology Symposium.
Mar. 4. R.Ae.S. Section Lecture: "Bogie Undercarriages," by F. A. Cousins, B.Ae.E., A.F.R.Ae.S.
Mar. 6. Institute of Metals: "Chromium and Chromium-rich Alloys," by Maj. P. L. Teed, F.R.Ae.S., M.Inst.Met.
Mar. 8. British Gliding Association: Annual General Meeting.
Mar. 11. R.Ae.S. Graduates' and Students' Lecture: "An Introduction to Supersonics," by C. H. E. Warren, M.A., A.F.R.Ae.S.
Mar. 12. R.Ae.S.: Fifth Louis Blériot Lecture: "The Future of the Flying-boat," by H. Knowler, A.M.I.C.E., F.R.Ae.S. (in Paris).
Mar. 13. R.Ae.C.: Film Show.
Mar. 19. Aircraft Recognition Society: "Future Developments in Civil Aviation," by Peter G. Masefield, M.A., F.R.Ae.S.
Mar. 21. Helicopter Association: "Recent Helicopter Research Investigations," by W. Stewart, B.Sc.
Mar. 25. R.Ae.S. Graduates' and Students' Section: Annual General Meeting, and Talk on "Aerodynamic Oscillations of Suspension Bridges," by C. Scruton, B.Sc., A.F.R.Ae.S.
Mar. 26. R.Ae.C.: Annual General Meeting.
Mar. 27. R.Ae.S. Section Lecture: "Civil Jet Aircraft Performance," by D. R. Newman, A.F.R.Ae.S.
Apr. 4. College of Aeronautics: Senior Common Room Society's Annual Dinner.
April 15. R.Ae.C.: Film Show.
Apr. 22. R.Ae.S. Graduates' and Students' Section: "Servo-mechanisms," by F. H. Borlace, B.Sc. (Eng.), Grad. R.Ae.S.
Apr. 24. R.Ae.S.: "Fuel Systems for Turbine-driven Aircraft," by J. E. Walker, A.F.R.Ae.S. (at Luton).
May 3. Vintage Aeroplane Club: Rally, White Waltham.
May 3-10. F.A.I.: Committee Meetings, Madrid.
May 10. Exeter Aero Club: Display.
May 10-11. l'Association des Amis de l'Aumôneries de l'Air: Cathedrals Rally.
May 17. Wolverhampton Aero Club: Display.
May 22. Aéro-Club du Dauphiné: Air Meeting, Grenoble.
May 22. Aéro-Club de France: Coupe Stemm (helicopters).
May 24-25. Ragosine-Auster Trophy Navigation Competition, Speeton, Filey, Yorks.
May 29. R.Ae.S.: Fortieth Wilbur Wright Memorial Lecture: "Prophecy and Achievement in Aeronautics," by Sir Harry M. Garner, C.B., M.A., F.R.Ae.S.
May 30-June 2. Model-flying team contest, Belgium v. Great Britain, Namur.
May 31. Swansea and District Flying Club: Welsh Air Derby, Fairwood Common.
May 31-June 2. Aéro-Club de Cannes: International Rally.
May 31-June 2. Ailes Sparnaciennes: Champagne Rally, Epernay.
June 2. S.S.A.F.A.: Air Display, Yeadon, Leeds.
June 4-14. Third Mechanical Handling Exhibition, Olympia, London.
June 6-8. Aero Club d'Italie: Air Circuit of Sicily.
June 7-8. Yorkshire Aeroplane Club: International Invitation Rally, Sherburn-in-Elmet.
June 14. Auster Flying Club: Rally, Rearsby.
June 14-15. Aéro-Club de Charente Maritime: Pons Rally.
June 21. R.A.F.A.: Air Pageant, Sydenham, Belfast.
June 21-22. Aéro-Club de Basse Normandie: Flers Rally.
June 22. Aéro-Club de Savoie: Aix-le-Bains Rally.
June 28-29. R.Ae.C.: La Baule Rally.
June 29. Northern Heights Model Flying Club: Gala Day, Hawker Airfield, Langley.
June 30-July 15. International Gliding Contests, Spain.
July 4-7. Aéro-Club de Belgique: Control-line Models World Championships, Knokke.
July 5-6. Aéro-Club de Touraine: Wines Rally.
July 5-7. R.Ae.C.: Deauville Rally.
July 6-13. Ailes Ardennaisés: Air Fête.
July 10-14. Kungl. Svenska Aeroklubben: Wakefield Cup Models Contest.
July 11-12. National Air Races, Newcastle-on-Tyne Municipal Airport.
July 12. Leicestershire Aero Club: Rally, Leicester East.
July 20-27. International Air Week, Italy.
July 26. Royal Engineers Flying Club: Air Day, Rochester.
Aug. 2. "Daily Express" Challenge Trophy Race.
Aug. 2-3. "ILSY" Air Display, Ypenburg.
Aug. 15. Aéro-Club de Charente Maritime: Laleu and La Rochelle Air Meeting.
Aug. 15. Ailes Montluconnaises: Rally.
Aug. 16. Aéro-Club de Vendée: Sables d'Olonne Rally.
Aug. 31-Sept. 7. Scandinavian Air Rally.
Aug. 31. A.B.A.C.: Summer Convention.
Sept. 2-7. S.B.A.C.: Flying Display and Exhibition, Farnborough.
Sept. 15. Battle of Britain Day.
Sept. 20. R.A.F. At Home Day.

A LIGHT DIESEL

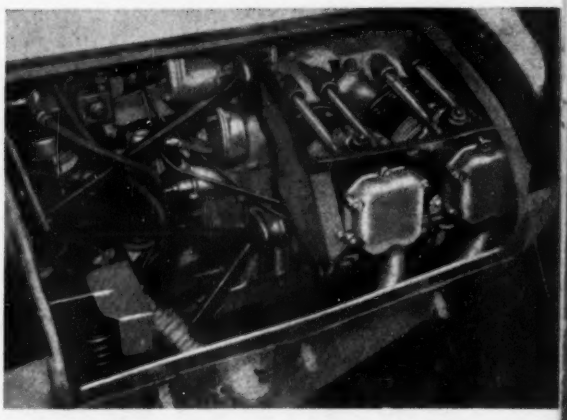
Simple U.S. Conversion of a Flat Four

DIESEL aircraft engines have appeared at intervals ever since the Kaiser's War, and a number of designs have been built in this country. The only compression-ignition engine ever to become a standard power plant on series-produced aircraft, however, was the German Junkers Jumo series of opposed-piston two-strokes, with a large blower driven from the crankshaft or by the exhaust gas to ensure good scavenging. The Jumo 204 was built under licence in Britain, as the Culverin, by the Napier Company.

Now comes news of a small diesel developed by Diesel Power Inc., of Pittsburgh, Pa. This engine embodies a number of features which render it of unusual interest, and it seems possible that, despite the development of the small gas turbine, much will be seen of the principle in the future.

Probably the chief drawback to the aircraft diesel has been the heavy construction demanded by the very high peak cylinder-pressure. According to a description in *Aviation Week*, the DPI engine embodies an "air cell" in the cylinder head, so located that fuel does not enter it. Although, apparently, no burning can take place in the cell, the burning of fuel in the main combustion space is stated by the makers to set up "a rapid succession of power pulsations until all the oxygen formerly contained in the cell is exhausted." This controlled burning is claimed to result in much smoother running, as well as flattening the engine indicator-diagram in a very useful manner.

In order to demonstrate the practicability of the principle, Mr. L. M. Barton, president of Diesel Power Inc., speaks of it as being applicable to any lightweight aircraft engine. The company's first engine of this type is, in fact, a direct conversion of the familiar Lycoming 125-170 h.p. O-290-D flat four, as installed in the Mk 5 Auster. The conversion has been made on an engine taken from a crashed radio-controlled target, and has involved no change in the basic design of the moving parts or bearings. New cylinder-heads have been substituted, and high-crown pistons fitted to raise the compression ratio. The air cooling has been retained—in fact the diesel appears to run cooler than did the original engine, a specimen cylinder-head thermocouple reading being about 310 deg F, as opposed to 425 to 450 deg F with petrol and spark-ignition.



The experimental installation of the Diesel Power Inc. engine in a Taylorcraft liaison aircraft. The generally clean appearance—resulting from the absence of any spark-ignition equipment—is remarkable.

The DPI engine is of approximately the same weight as the original Lycoming, but whereas the engine formerly consumed about 9 gal/hr of fuel at cruising, the DPI, burning kerosene, uses only 4½ gal/hr, or, on heavy diesel oil, 3 gal/hr.

The engine is at present being tested in a Taylorcraft liaison aircraft; Taylorcraft have an arrangement with DPI by which they have exclusive use of any DPI engine up to 500 h.p.

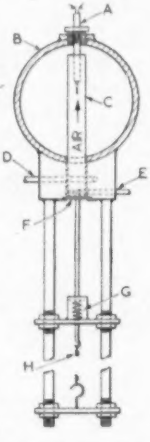
Principal data include: Bore, 4¾in; stroke, 3¾in.; displacement, 290 cu in; b.h.p., 100 at 2,400 r.p.m., 125 at 2,600 r.p.m.; dry weight, 245 lb approx.; compression ratio, 14 : 1; fuel injection by Bosch 4-A pump delivering at 1,200 to 1,500 lb/sq in to three-hole nozzles.

GAS TURBINE TEMPERATURE-SENSING UNITS

EFFICIENT operation of a gas turbine demands that, wherever the gas temperature exceeds the maximum permitted value, the temperature-sensing device shall respond with the minimum time lag. Consequently, the response-rate of this unit is of paramount importance, and yet great difficulty has been experienced in determining this factor in the laboratory, due to the impossibility of reproducing operating conditions exactly.

Apparatus developed by Messrs. Dahl and Flock, of the U.S. National Bureau of Standards, is designed to give the best approximation to the conditions obtaining in the combustion stream, the heat transference to the sensitive element being primarily by forced convection.

This equipment consists essentially of a Jumo 004 combustion chamber supplied by air from a blower and provided with a device for producing rapid changes in the temperature of the mounted temperature-response unit. The efflux from the combustion chamber is led into a straight test-section in which are three convenient instrument-mounting points. The ducting to the test-section is provided with a perforated baffle in order to ensure an essentially uniform temperature across the central half-diameter of the gas flow, and bends to eliminate direct radiation falling on the instrument. Pressure, temperature and mass flow of the gas stream are all accurately controlled and measured by suitable valves and instruments.



Principal components of the Dahl and Flock temperature-sensing test-device.

A = Sensing unit.
B = Duct test-section.
C = Inconel tube.
D = Cooling-water inlet.
E = Cooling-air inlet.
F = Release plate.
G = Cushioning spring.
H = Actuating spring.

In order to obtain the maximum temperature-change rate at the test instrument, the instrument was enclosed in a vertical Inconel tube in which a flow of cold air was maintained. The mounting of this tube is shown in the accompanying cross-section of the test-section. It will be seen that, upon operation of the release plate, the Inconel tube is plucked downwards by a spring; almost instantly the test instrument is exposed to the maximum gas temperature, while the supply of cold air is automatically cut off. In this way the sensing element at a controlled moderate temperature is brought into sudden and intimate contact with any gas flow within the capacity of the apparatus.

This test equipment has been used to study elements encased in metal and ceramic protection tubes and elements embedded in insulating materials such as quartz and beryllia. The characteristic time (that required for the element to undergo 63.2 per cent of the total temperature change imposed) has been determined for a large number of elements when subjected both to rapid heating and rapid cooling, and the apparatus has been used to develop response periods of the order of 0.02 sec for a wide variety of thermocouples, thermistors and resistance thermometers.

NAVIGATIONAL

"Burton's Nautical Tables" (5th Edition). George Philip and Son, 32, Fleet Street, London, E.C.4. Price 22s. 6d.

NAVIGATIONAL tables, while hardly inspiring reading, are an essential item on many bookshelves; those of Burton, while of prime concern to mariners, are sufficiently comprehensive to warrant a mention in these pages. This fifth edition published, includes a great deal of new material to meet the demands of modern navigational techniques, while the original matter has been largely rearranged and expanded. In its present form, the publication is designed to meet the examining requirements of the Extra Master's standard for many years to come.

POWER STEERING for AIRCRAFT

A Summary of the R.Ae.S. Lecture by K. G. Hancock and P. Person

THERE are certain major components of the modern aircraft which are so apt to be taken for granted that their design and refinements are largely overlooked; and when a specialist in one or other of these units reveals the details of his subject in a lecture there are usually many among his audience who obtain a proper appreciation of his task for the first time. These thoughts are particularly applicable to the paper *Power Steering for Aircraft*, prepared by K. G. Hancock, B.Sc., A.F.R.Ae.S., and P. Person, M.A., A.F.R.Ae.S. for delivery to the Royal Aeronautical Society last night, February 21st. This was one of the R.Ae.S. "main" lectures held periodically in provincial centres; in this case Hull was the venue.

In their introduction, the authors emphasized that in providing power steering for the typical tricycle-undercarriage aircraft of today the problem was to provide a satisfactory performance for the minimum installation weight. As always, the matter was a compromise between what the pilot would like and what the designer could give, and cost as well as weight penalties must be kept down.

The manœuvres which the pilot would require to make with the aid of his steering were as follow: (i) turns of small radii at very low forward speeds to facilitate manœuvrability on the apron and close parking; (ii) turns of larger radii at higher forward speeds on the runway; (iii) maintenance of directional control during the early part of a yawed take-off and during the latter part of a yawed landing; and (iv) for a multi-engined aeroplane, the correction of the out-of-balance thrust effects of the engines in a yawed take-off in which one engine was inoperative. Such an occasion arose when an aeroplane was required to return to its base for repairs to a defective engine.

From the aircraft designer's point of view the theoretical aspects of the steering problem were as follow: (i) estimation of the net steering torque and steering rate; (ii) methods adopted to suppress shimmy and the amount of damping torque involved; (iii) estimation of torque necessary to centre the undercarriage before retraction; (iv) estimation of the gross steering torque which followed immediately from the foregoing calculations; and (v) evaluation of the characteristics of the actuating mechanism.

Hypothetical Aeroplane

For the purpose of description the authors then considered a hypothetical aeroplane of 120,000 lb all-up weight, with a twin-tandem-bogie main undercarriage and twin-wheel nose undercarriage. The nosewheel caster axis was vertical, the mechanical trail 5.4in, the total trail 7.9in, the wheel spacing 25in, and the weight of wheel assembly castering parts 185 lb. As a preliminary to the estimation of the net steering torque and rate of turn, the authors briefly discussed cornering and longitudinal-slip characteristics of tyres. When a tyred wheel which was rolling forwards was rotated about its vertical axis, the elastic properties of the tyre were such that it was possible for the wheel to track forwards while it rotated in a plane inclined to the line of motion at an angle called the "cornering angle."

The restoring forces which arose from ground-friction effects were found to resolve into a side force acting perpendicularly to the plane of the wheel. This force varied with the vertical wheel load, the tyre-to-ground coefficient of friction and the elastic tyre properties. The lecturers showed curves for fully effective tyre-to-ground sliding coefficients of friction of 0.4 and 0.7, which were the approximate limiting conditions for wet and dry concrete-runway friction. The local peak value, occurring at approximately 20 deg cornering angle, was the static friction coefficient corresponding to the fully effective sliding coefficient.

The cornering force was generally offset from the centre of the tyre ground-contact area by a distance termed "pneumatic trail." This trail, usually considered positive when behind the centre of contact area, was found to vary chiefly with the cornering angle and the length of contact path of the tyre.

For a castering wheel with a vertical caster axis, the distance between the caster axis and wheel axis was termed "mechanical trail." The algebraic sum of the mechanical and pneumatic trails was termed "total trail."

After discussing longitudinal slip of two wheels on a common axle the lecturers went on to consider the path of the aeroplane in a turn, to define steering rate—the rate of turn of the nosewheel about its caster axis—and to discuss net steering torque.

Forms of shimmy and their suppression then came under discussion. Nosewheel shimmy was divided into two basic forms—"large-angle" and "small-angle" shimmy. The former was a shimmy in which the tyre reached its sideways limiting friction and slid sideways for a portion of each swing. It usually had a frequency in the region of 8 to 10 cycles per second and was extremely violent.

Small-angle shimmy was an oscillation within the adhesion range of the tyre and usually had a frequency greater than the large-angle variety. It was known to be influenced by the following factors: (i) geometry and relative masses of the undercarriage and wheel assembly; (ii) lateral and torsional stiffnesses of the undercarriage and its mounting; (iii) backlash of the castering parts; and (iv) tyre-stiffness characteristics.

Small-angle shimmy must be adequately suppressed since, apart from obvious detrimental effects on the motion of the nosewheel, it was likely to induce fatigue loads and invited resonant vibrations elsewhere in the aeroplane.

Suppression of shimmy could be achieved by one or a combination of methods: (a) caster axis friction; (b) wheel coupling; and (c) hydraulic damping. Discussing these three methods, the authors stated that built-in caster-axis friction should be employed to deal with small-angle shimmy and hydraulic-orifice-type damping used to suppress large-angle shimmy. Next they estimated the gross steering torque for the hypothetical aeroplane. This was evaluated in terms of P, the nosewheel reaction, and c, the total trail which, for the maximum nose load, were 14,500 lb and 7.9in respectively.

Shimmy damping torque provided by leg friction and the multi-plate friction damper was taken as $cP/16$, i.e., 7,160 lb in. This caster-axis friction torque would have only a small effect on the freely castering properties of the leg.

The centring device, incorporated to ensure that the undercarriage was centred before retraction had to provide 1,000 lb in torque if the design case of one g sideways was assumed. In most cases, the centring torque had to be overcome by the steering torque when steering the aeroplane.

The maximum net steering torque was fixed so as to limit the cornering angles of the nosewheels to a maximum of 8 deg on a surface with a sliding coefficient of friction equal to 0.7. From a cornering curve shown the corresponding side force coefficient was seen to be 0.6 and so the requisite torque was 0.6 cP, i.e. 68,000 lb in.

Summing these torques and allowing 7 per cent for friction losses in the steering jacks, the gross steering torque was 82,500 lb in, i.e., 0.73 cP.

In their discussion of gross steering torque the authors mentioned the calculation of the steering path of the aeroplane, and the case of landing with one tyre deflated.

Steering Circuits

On the subject of steering circuits, the main requirements were: (1) to enable the pilot to steer the aeroplane; (2) to provide hydraulic shimmy damping; (3) to centre the unit before retraction; and (4) to permit free castering.

As usual, the designer was faced with the choice of using hydraulic, electric, or pneumatic power; the authors selected for their purpose a main hydraulic system of 3,000 lb/sq in. The system of controlling the hydraulic power could be one of two forms having the following characteristics: (i) rate of steering proportional to the amount of error; and (ii) rate of steering independent of the amount of error, but a function of the frequency with which the error changed.

Sensitivity could be defined as the ratio of maximum angular error between the pilot's control and the steerable wheels, to the full steering range. The factors giving loss of sensitivity were: (i) backlash on either side of the selector; that is, in the manual or power sides of the follow-up; (ii) excessive valve overlap and travel to the fully open position; (iii) insufficient velocity ratio at the lost-motion device to operate the selector; (iv) backlash in the lost-motion device.

Sensitivity could be improved by mechanical means, such as reducing backlash in cable-runs by adequate pre-tensioning, or by increasing the velocity ratio at the point in the follow-up where the selector was operated. It could also be improved in the selector by using a negative-overlap scheme.

The authors illustrated two basic circuits used to obtain shimmy-damping and free-castering characteristics, and discussed methods by which the nose undercarriage could be centred before retraction. For example, this could be done by centring cams engaged by the shock-absorber at take-off, spring loaded centring cams, and so on; but if one of more steering jacks were included on the nose undercarriage, it was an advantage if these could be used for centring purposes.

Finally, the lecturers referred to back-pressure thermal effects and torque relief. Some back pressure in a steering circuit was desirable to remove sponginess due to dissolved air in the fluid. The recommended value of this pressure was between 200 and 500 lb/sq in.

The steering circuit must be so designed that excessive pressures were not produced by thermal expansion of fluid. Also, if fluid was lost from the circuit during expansion, the jacks should not be allowed to cavitate on fluid contraction, otherwise efficient hydraulic shimmy-damping would not be achieved. Torque relief was desirable to prevent excessive loads being imposed during ground manœuvring.

Authors' Proposed Circuit

The lecturers then proposed and illustrated a steering and shimmy-damper circuit for their hypothetical aeroplane. It employed a slide selector giving rates of steering proportional to the error signal; and mechanical follow-up with toggles round the retraction pivot. Shimmy-suppression was by a certain amount of built-in caster-axis friction plus hydraulic damping. The circuit was maintained full of oil under all conditions by a pressure-maintaining valve set at 200 lb/sq in, which also produced sufficient back pressure to remove sponginess. Free castering was obtained by allowing the jack and tank ports in the selector to be connected in the neutral position. Centring on retraction was by separate pistons incorporated in the steering jacks, and connecting the steering circuit to the undercarriage up and down lines so that pressure was applied to both sides of the jacks during retraction. This also ensured that steering was inoperative during flight. An effective steering torque from 0 to ± 40 deg was achieved and the unit was free to caster through ± 90 deg without manual disconnection. The pilot's control was by a small handwheel and, with this circuit, an error between the pilot's wheel position and steerable wheels of approximately ± 4 deg at the central position would be expected.

For permission to publish their paper the authors gave acknowledgements to Electro-Hydraulics, Ltd.

CIVIL AVIATION

BUSY YEAR FOR U.K. AIRPORTS

THE Ministry of Civil Aviation announced last week that United Kingdom airports together handled more than 2,500,000 passengers in 1951. For the first time, more passengers passed through London Airport than through Northolt—796,000 compared with the latter's 750,000. Passenger traffic at London Airport in the last two years has more than doubled, whereas at Northolt it was only slightly higher than last year, owing to the transfer of many of the busiest services to London Airport.

Outside the London area, Glasgow (Renfrew) handled 140,000 passengers, slightly more than in the previous year; Belfast, with 134,000 recorded the second highest total; and of the others Prestwick handled 128,000, Manchester 115,000, Liverpool 84,000, Eastleigh 50,000 and Birmingham 39,000. In the Channel Islands, Jersey Airport dealt with 197,000 passengers, a figure exceeded only by London and Northolt.

Freight traffic was 41 per cent higher than last year; U.K. airports together handled 48,000 short tons.

EX-B.O.A.C. SOLENTS

RENEWED discussion on the future of flying-boats, which has followed Sir Frederick Bowhill's lecture last week, has led several people to wonder what is happening to the beautifully fitted ex-B.O.A.C. Short Solents. Unfortunately, very little information is officially forthcoming. Originally these aircraft were on hire to the Corporation from the M.C.A., and on being taken out of service all twelve were flown back to Belfast. Later it was announced that one had been sold to Aquila Airways, and recently a short-term option has been taken by this same company on three more of them. Of the remaining seven, some—possibly only two—may be sold to a Canadian operator acting through agents. The company concerned may be Central British Columbia Airways, Ltd., a charter company which now plans to operate a freight and passenger service between Vancouver and a new township which is growing up in connection with big aluminium mining developments at Kitimat, 400 miles up the coast to the north.

I.o.W. WANTS AN AIR CAR-FERRY

THE services of Silver City Airways seem to be in great demand. A new proposal has been put to the company that they should operate a car-ferry into the Isle of Wight. According to a local correspondent, I.o.W. people are dissatisfied with the railway steamers and co-ordinated private steamship services because of time and congestion (1 hour, plus 20 minutes to load a car), delay in the summer, and the high fare of £3 15s 7d return for a 14-ft vehicle.

By air, the shortest distance is about nine miles from Portsmouth to Ryde. There seems to be good promise for a seasonal air ferry, but in spite of the Bristol Freighter's ability to operate from quite small fields, the I.o.W. has barely adequate facilities to offer: Ryde for the present has 800 yd maximum, and Lea (Sandown) a strip of 1,100 yd. Silver City's Freighters are, in any case, already heavily committed.

CENTRAL AFRICAN AIRWAYS

AT a recent conference held at Central African Airways Corporation's headquarters, Col. Sir Ellis Robins, D.S.O., E.D., the chairman, announced that his company was bringing in, as from January 28th, a timetable based on that originally intended for introduction at the beginning of this year, but which had to be suspended owing to the temporary withdrawal of Viking aircraft.

Engineering work involving the replacement of Viking spar-booms had proceeded rapidly, said Sir Ellis, with the result that C.A.A. now had five Vikings operational although, aircrew training having been delayed, one of these machines was being allocated to such duties for a period of 14 days. Continuing, he said that a second new Viking was due to come from England early this month. Similar to that which arrived last month, this second machine is fitted with 27 of the luxury "Cool-air" seats which C.A.A. have had specially designed for improved passenger comfort when flying in tropical Africa.

Concluding, Sir Ellis Robins said, "I feel sure the travelling public will be glad to know that we are getting the Vikings back in the air again. The fact that they are popular with our passengers is proved once again by the record we achieved in December when passenger traffic exceeded that of December 1950 by the phenomenal amount of 54 per cent."

The general manager of C.A.A., Mr. Robert G. McCoy, commented on the C.A.A. fleet position and confirmed that the Corporation will be operating a fleet of nine Vikings by the end of this month, by which date the 1952 timetable will be in full operation. A DC-3 and a Dove which have been operating local services between Salisbury and Blantyre and between Bulawayo, Livingstone, Lusaka and Fort Jameson, and occasionally between Salisbury and Bulawayo, will be progressively withdrawn and replaced by Vikings.

OVERLOADED C-46s

THE United States Civil Aeronautics Board has found "apparent laxness" in operating practices among non-scheduled airlines whose aircraft were involved in three recent accidents. The Board made this comment in issuing a new Special Civil Air Regulation under which a reduction of 1½ tons has been ordered in the maximum take-off weight of passenger-carrying C-46s. The ruling is of a temporary nature and will remain in force until further investigations have decided whether it shall stay as a permanent limitation, or whether it shall be a preliminary to still further reductions in the take-off weight of this type.

There are now 83 C-46s in passenger service in the United States. In point of fact, the passenger version of the C-46 does not meet regulations governing scheduled airlines at either the old or new operating weights. Although take-off weight has now been reduced from 48,000 to 45,000 lb, the C.A.B. examiner has calculated that in order to meet the rules applicable to scheduled operations the C-46 take-off weight would have to be restricted to 35,900 lb.

The new regulation does not affect the 66 C-46 freighters used by Pan American in South America and by other U.S. cargo carriers. The laxness to which the Board has referred is said to have been apparent in (1) Failure to maintain a standard of pilot training and proficiency at a desirably high level; (2) Allowing the standard of aircraft and engine maintenance to fall below a desired standard; (3) Failure by companies and personnel to follow operating procedures laid down in the Civil Air Regulations, including those relating to maximum operating weights.

CARRIERS' LIABILITY

IMPORTANT changes in the law governing the liability of the carrier by air of passengers and cargo under arrangements or contracts subject to United Kingdom jurisdiction will come into operation on April 1st. This is consequent on the issue of the Carriage by Air (Non-International Carriage) (United Kingdom) Order, 1952.* The Order does not extend to the law of Jersey, Guernsey or the Isle of Man.

Under the Warsaw Convention, 1929, to which effect was given in the United Kingdom by the Carriage by Air Act, 1932, a carrier by air undertaking "international carriage" is liable for damage sustained in the event of death or injury of a passenger, loss of or damage to goods, or of delay, unless he can prove that he and his agents have taken all necessary measures to avoid damage or that it was impossible to take such measures. The liability of the carrier is limited and there is a time limit for the bringing of an action.

The new Order applies the Warsaw Convention rules, with certain modifications, to all carriage by air not previously subject to the Act, that is, to carriage by air which is not "international carriage" within the special meaning of that term as used in the Convention.

"International carriage" is defined in the Convention as any carriage in which, according to the contract made by the parties, the place of departure and the place of destination, whether or not there be a break in the carriage or a transhipment, are situated either within the territories of two High Contracting Parties or within the territory of a single High Contracting Party, if there is an agreed stopping place within a territory subject to the sovereignty, suzerainty, mandate or authority of another Power.

Carriage by air which is not "international carriage" can therefore include, for example, all carriage by air within the United Kingdom, carriage from London to Malta without an intermediate stopping place, and carriage from London to Cairo or Johannesburg, the Governments of Egypt and the Union of South Africa not being at present parties of the Convention.

The Order renders null and void any provision in a contract of carriage tending to relieve the carrier of liability or tending to fix a lower limit of liability than that which is laid down in the Order.

Special arrangements are being made for flying clubs and gliding clubs. The Order gives the Minister of Civil Aviation power to exempt from its provisions any carriage by air or any class of carriage by air, subject to such conditions or limitations as he

* *Published as Statutory Instrument 1952 No. 158 by H.M. Stationery Office, price 6d (by post 7½d).*

thinks fit. The Minister's power of exemption is provided solely for the purpose of exempting from the provisions of the Order carriage by air performed by a flying club or gliding club, subject to certain conditions. One of these conditions is that the exemption will apply only in respect of members whose period of membership is not less than one month and who have accepted in writing as a condition of their membership that in their case the club shall not be liable for death, injury, loss or damage sustained during carriage by air in a club aircraft. A memorandum explaining the procedure for applying for exemption is being circulated to clubs by the M.C.A.

LITTLE AND OFTEN

A LITTLE over four years ago, Clark Carr, a veteran barnstormer of Albuquerque, New Mexico, formed an air service to link his home city with the rapidly growing "atomic" township of Los Alamos, 65 miles distant.

He was at once faced with the difficulty of matching his aircraft with the Los Alamos landing strip, which has a maximum length of 1,330 yd, is surrounded by mountainous country, and is itself at a mean elevation of 7,100ft. Los Alamos was, in fact, chosen for atomic research partly on account of its inaccessibility.

The final choice was the Beechcraft Bonanza, seven of which have formed the nucleus of the resultant company, Carco Air Service. Since its formation in 1947, Carco has strictly followed the "little and often" dictum; true, this has been partly determined by circumstances, but the needs of the Atomic Energy Commission have perhaps been better met by small aircraft on frequent schedules than would have been the case if larger aircraft had been used. The scientists and their families, of course, form the bulk of Carco's passenger-loads.

From Albuquerque, the company also operates "non-sked" services to any required part of the U.S.A., using three large transport aircraft, two of which—a C-47 and a C-54—are leased from the U.S.A.F.

Until recently, Carco had been unable to find any equipment representing an improvement over the Bonanza. In September 1951, however, the company took delivery of the first Twin Bonanza (actually a hand-made prototype) to be sold by the Beech Aircraft Corporation. The power units are 260 h.p. flat-six Lycomings—the single-engined Bonanza had 185 h.p.

The Twin, the layout of which can be seen in the accompanying photograph, seats three persons on each of two broad bench seats, as in usual American car practice. Since there is only one door—on the starboard side—the pilot must be first in and last out, for he sits on the extreme left of the "front bench". (Carco have suggested moving the door to the port side.) On the Los Alamos to Albuquerque route, cruising at 8,500ft (1,400ft above ground level), 65 per cent of the Twin Bonanza's maximum power will give a true cruising speed of 190 m.p.h.

LUCKY STRIKE: Carco has received two Twin Bonanzas so far, with one more to come. One of these aircraft is here seen flying on the Albuquerque to Los Alamos route; note the rugged New Mexico terrain.

Carco has been using lower engine settings of 19in Hg manifold pressure and 2,600 r.p.m., giving a T.A.S. of 171 m.p.h. for 136 b.h.p. per engine (57 per cent M.E.T.O.). At these settings, fuel consumption has averaged much less than the 25.7 gall hr. obtained at 190 m.p.h.

The aircraft is said to have climbed out of Los Alamos with an airscrew feathered, and has also been subjected to an "accelerate to stop" test on the 4,000ft-long mountain strip, all at 5,500 lb (the maximum weight). At this 7,000ft altitude, the rate of climb has varied from 800ft/min at 105 m.p.h. to about 500ft/min at 130 m.p.h., while single-engined climbs of 60ft/min have been maintained, at 90 m.p.h.—again at maximum weight.

The following figures have been given for Carco's Bonanza services since August, 1947: 39,473 passengers, 695,236 lb of freight and baggage, 140,687 lb of mail, and 1,771,238 revenue miles flown. Incidentally, Carco has always carried mail as a courtesy service, without pay from the U.S. Post Office; it is believed that this is a unique state of affairs.

BREVITIES

THE Australian Minister for Civil Aviation, Mr. H. L. Anthony, said recently that Trans-Australia Airlines were negotiating for the purchase of new aircraft from Britain. The make and type have not yet been revealed, but negotiations are said to have reached a satisfactory stage.

* * *

Last week, for the first time since the recent disturbances, B.O.A.C. resumed services through Cairo, when an aircraft from Nairobi called at Farouk Airport on its way to London. The Corporation's services to the East, the Far East and Australia have been operating *via* the North Mediterranean route and Beirut.

* * *

Le Touquet Airport, situated on the North French coast between Boulogne and Le Havre, is to be modified and expanded at a cost of—according to latest figures—£300,000. A new 1,200-metre runway is to be built in an E.N.E.-W.S.W. direction, while the existing German-built N.-S. runway is to be extended from 1,000 m to 1,200 m.

* * *

With the abolition of their "first-class" fares as from May 1st, Trans-Canada Air Lines announced last week that the return fare between London and Montreal will be reduced from £244 19s to £170 7s and that between Montreal and Paris from £257 16s to £183 5s. T.C.A. will continue to operate their 40-passenger Canadair North Stars on the Transatlantic routes and will make no change in existing seating or cabin interior arrangements.

In accordance with the general agreement on the introduction of tourist class services, the company will no longer provide free meals or cocktails and the free-baggage allowance will be reduced from 66 lb to 44 lb. A moderately priced meal service will be available.

* * *

As one means of offsetting rising operational costs of air transport, Australia's airlines are making a general effort to increase the amount of freight carried on passenger liners. Executives have admitted that goods traffic is vital to the survival of their airlines, and plans are being prepared for sales promotion drives to boost the amount secured.

* * *

From the United States we learn that a Ryan Navion has been modified for use as a test-bed by an aircraft equipment firm, to the extent of having two 125 h.p. Lycoming engines fitted. The nose has been faired off and the machine now broadly resembles a smaller version of the Beech Twin Bonanza.

* * *

Passenger night-flying is to be expanded considerably by the New Zealand National Airways Corporation to meet an increasing demand. Apart from the Auckland-Wellington-Christchurch passenger route (to which night-flying is at present restricted) the airports at New Plymouth, Gisborne, Hamilton, Blenheim and Nelson have so far been chosen for future night use.

* * *

More frequent links between Glasgow, Edinburgh and the European capitals are planned by B.E.A. in their summer schedules. A service from London *via* Edinburgh to Aberdeen, Inverness, Wick and the Orkney Islands is also planned. Schedules from Renfrew Airport to Dublin and Belfast will be increased, and it is also hoped that Ireland will, for the first time, be linked with Edinburgh direct.

* * *

In *M.C.A. Information Circular No.* 13/1952, attention of pilots is drawn to a recent accident which occurred when, following an attempted precautionary landing by a light aircraft, a passenger who was not strapped in was thrown through the roof on impact and was killed. There have been two previous cases in recent years of passengers having been thrown out through cabin roofs The *Circular* strongly recommends that, as far as is practicable, the occupants of light aircraft which have an unrestricted expanse of Perspex or light material in the cabin roof should remain strapped in during flight.

CIVIL AVIATION . . .

FROM THE CLUBS

MALAYAN RALLYISTS: A general view of the aircraft park at the rally described on this page. The Miles Gemini disgorging its luggage is being watched by the Assistant Director of Civil Aviation, Mr. Max Oxford.

Commonwealth Activity: News from New Zealand, Canada and the Far East

AN example of how a flying club can sometimes be of assistance to the general public is contained in news from the Wellington Aero Club in New Zealand. Last month the club's light aircraft made no fewer than 190 passenger-carrying crossings of the Cook Strait. This was the busiest operational month since the club was founded 20 years ago. The machines carry three passengers and make the crossing from Rongotai to Blenheim in about half an hour. The club will continue to run these services until the National Airways Corporation can operate suitable passenger aircraft from Rongotai Airport, Wellington. A profit of £1,500 was made in the last financial year on this service and it is these commercial operations which help to maintain the training side.

Also from New Zealand we hear that the New Plymouth Aero Club's hangar and workshops suffered extensive damage in an early-morning fire which broke out at Bell Block Airport. A Proctor, owned by the club's president, Mr. H. W. Lightband, was completely destroyed and two other machines were badly damaged.

BEFORE a meeting of the Royal Canadian Flying Clubs' Association which was held last month, the chairman of the Canadian Air Transport Board, Mr. J. R. Baldwin, reported the results of a recent investigation into the current state of club flying in Canada. He said that the present scheme under which the government paid grants for pupils trained by the clubs and the commercial flying schools had become effective at the beginning of 1949 and had had a marked effect on the quantity and quality of flying training. Never before had opportunities for flying training comparable with those now available existed in Canada. The clubs and the schools were becoming more skilled and more forceful in the expansion of training; this was borne out by the record of achievement and increase since the beginning of 1949. Instructional hours flown had increased from 44,000 in 1949 to about 63,000 in 1950 and to an estimated 77,000 in 1951. The number of students who had graduated from the clubs and the schools in that period had increased from an average of 63 a month in 1949 to 106 a month in 1950 and almost 130 a month for the first eight months of 1951. All in all, growth had been steady and to the best of the Board's knowledge a reasonably good market for flying training remained. Provided proper initiative and foresight were maintained, the amount of civil flying training performed in 1952 should break all records.

Mr. Baldwin said that the investigation had been made primarily to see whether there was any truth in the allegation that the Government's system of subsidizing the flying clubs had been carried out at the expense of the commercial flying schools. It had been proved that this was not so. There was no great disparity in rate-structures between the charges made by clubs and schools and the fact that the Government had followed the practice of leasing hangars to flying clubs on a dollar-per-hour basis did not, in the Board's opinion, constitute an unfair benefit to the clubs. One conclusion, he said, had been extremely important: it was discovered that flying training revenue represented some 84 to 88 cents for every dollar expended, the schools having a slightly better record in this respect than the clubs.

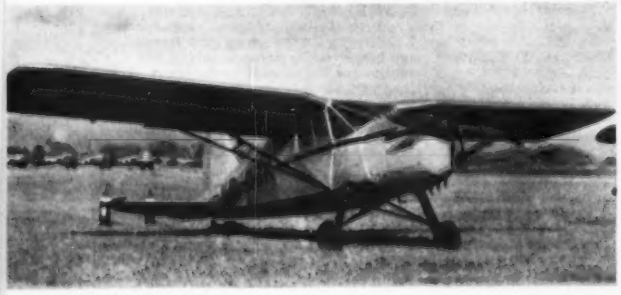
THE Royal Singapore Flying Club reports that from May 1947—when the club began its post-war flying—until the end of 1951, a total of 6,899 hr had been logged. (It is worthy of note that this figure exceeds the total post-war flying times for many of our own clubs at home.) An average of 192 hr 50 min a month was recorded during 1951, the total time for that year amounting to 2,312 hr 10 min. The R.S.F.C. hopes to start night flying again shortly, in both Tiger Moths and Austers.

Until recently, club members wishing to obtain licences had merely to undergo the old "A" licence test, but since February 1st they have been required to take the full P.P.L. examination, including the two written papers and the oral test. The flying time necessary for the P.P.L. is 40 hr (30 hr if the R.S.F.C. becomes an approved school), of which 25 hr must be solo.

Incidentally, the Royal Singapore Flying Club is still finding it possible to operate their club machines at only £2 16s per hr during the day, whilst night-flying is at £4 4s.

FURTHER news from the Far East comes from Kuala Lumpur where, in the first all-Malayan air rally held since the war, Penang won a series of competitions, scoring three points, with Singapore second with two and a half and Kuala Lumpur and Ipoh third with two points each. With brilliantly fine weather for the two days, the competitions included a forced landing event for the Dane Cup, an inter-club race, a navigation and spotting exercise and an individual forced-landing competition for the Low Yat Cup. Aircraft taking part included six Tiger Moths, two Austers, a Cessna 120 and a less common type—a K.Z. III (Lark), Danish built and owned by Mr. S. P. Moller of Jenderata Estate, Perak.

A LARK IN MALAYA: This smart and unusual aircraft is a frequent visitor to Kuala Lumpur. As mentioned elsewhere on this page, is a Danish K.Z. III powered by a Cirrus Minor II; it recently took part in the all-Malayan air rally.



ONE of the first flying events of the year has been arranged by the Southern Aero Club (formerly the South Coast Flying Club) which operates from Shoreham, in the form of a lunch patrol to be held on Sunday, March 2nd. Defending aircraft will be airborne between 12.15 and 12.45 p.m. and within an area of approximately three miles from the airfield; invaders must try to reach the airfield undetected, flying at between 1,000 and 2,000ft. No approaches will be allowed from the seaward side of the main Brighton to Portsmouth railway line, which runs along the southern side of the airfield. A free lunch will reward pilots who manage to penetrate the defences and land without having their registration letters taken.

Incidentally, the Southern Aero Club now has a total membership of 140 and, with Mr. C. L. Pashley as its C.F.I., has been averaging about 50 hours' flying a month during the winter. The S.A.C. fleet consists, at the moment, of two Maggies with the hope of an additional Gemini, Autocrat and Messenger which will be available for club flying shortly.

SERVICE AVIATION

Royal Air Force and Naval Aviation News

The Queen's Message

THE following message from Her Majesty the Queen was received by the Secretary of State for Air, and has been promulgated to the Royal Air Force at home and overseas :—

"On my accession to the Throne, I wish to assure my air forces at home and overseas of my gratitude for their services to my beloved father and of my confidence in their loyalty and efficiency.

"My father won his wings as a young man and watched with pride the rapid development of the Royal Air Force and its sister forces throughout the Commonwealth. I was glad to be able to present his Colour to the Royal Air Force in the United Kingdom last year, and I value highly my own association with the Royal Auxiliary Air Force.

"In a short time, the air forces of the Commonwealth, by their skill and courage, have earned a reputation and established traditions of which they may well be proud. Their heroic exploits in the second world war will never be forgotten. Now, in far-flung stations over the world, they play a constant and always hazardous part in protecting the security of our territories and communications.

"I assure them of my personal solicitude for their welfare and I trust that they will continue to display that pride of service and unswerving allegiance to the Crown which they have ever shown."

At the King's Funeral

A COMPOSITE detachment of 350 officers and men, drawn from all the home Commands, the R.A.F. Regiment and the Royal Auxiliary Air Force led the funeral procession of His Late Majesty King George VI from Westminster Hall to Paddington Station. The contingent was headed by the Royal Air Force Central Band, behind which came 40 officers and men from the R.Aux.A.F. squadrons of which the Queen and Queen Mother are Honorary Air Commodores. In command was G/C. R. J. A. Ford.

The Queen's Colour, which was presented to the R.A.F. by the Queen when she was Princess Elizabeth, was paraded by a Guard of Honour at Westminster Hall, and four officers and ten airmen of the Queen's Flight accompanied other officers of the Royal Household in the procession. A. Cdre. E. Fielden and G/C. P. Townsend were members of the Escort.

Marshals of the Royal Air Force Lord Douglas of Kirtleside, Viscount Portal of Hungerford, Lord Newall and Lord Tedder were present and the Air Council was represented by Air Chief Marshal Sir William F. Dickson and Air Chief Marshal Sir Arthur P. M. Sanders.

Representing their Commands in the procession were Air Chief Marshal Sir Hugh Pughe Lloyd, Air Chief Marshal Sir John W. Baker, Air Marshal Sir Hugh S. P. Walmsley, Air Marshal Sir Basil E. Embry, Air Marshal Sir John Whitworth Jones, Air Marshal Sir Robert M. Foster, Air Marshal A. C. Stevens, Air Marshal Sir Thomas A. Warne-Browne, A.V-M. R. S. Blucke, and A.V-M. W. J. Seward.

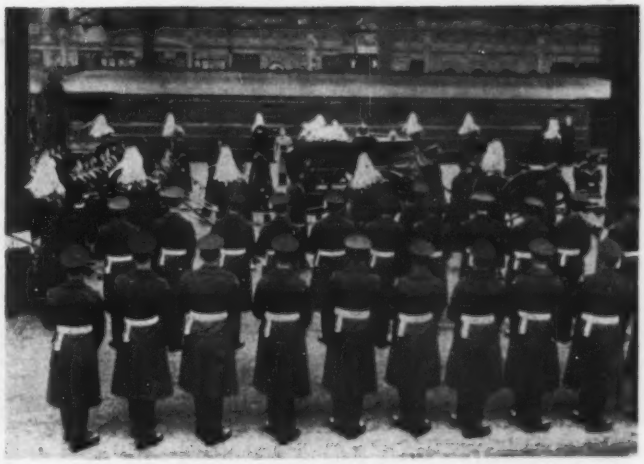
The Air Ministry staff was represented by Air Marshal Sir Colin W. Weedon, A.V-M. F. N. Trinder, A.V-M. A. C. Sanderson and A.V-M. C. E. N. Guest.

Representatives of the Forces of which his late Majesty was Air Commodore-in-Chief were: A.V-M. S. C. Strafford (R.A.F. Regt.), A. Cdre. G. H. Vasse (R.O.C.) and G/C. J. M. Birkin (R.Aux.A.F.).

The Commonwealth Air Forces were represented by A. Cdre. M. Costello (Canada), A. Cdre. A. L. Walters (Australia), A. Cdre. C. E. Kay (New Zealand), Col. J. J. C. Venter (South Africa), G/C. E. W. Pinto (India) and G/C. A. M. Morad (Pakistan).

Air *aides de camp* in the procession were: Air Chief Marshal Sir William Elliott and Air Chief Marshal Sir Ralph Cochrane. The following *aides de camp* were also present: A. Cdre. F. Crerar, A. Cdre. J. H. Edwards-Jones, G/C. R. L. M. Hall, G/C. F. J. A. Tanner, G/C. O. L. M. Brown, A. Cdre. T. U. C. Shirley, G/C. R. C. Mead, A. Cdre. R. B. Lees and G/C. W. H. Kyle.

A route-lining party, made up of 1,200 officers and airmen from Technical Training Command and 50 A.T.C. officers and cadets, under the command of G/C. B. A. J. Crummy was on duty.



THE ROYAL FUNERAL: The scene at Paddington Station as the R.A.F. contingent present arms in salute as the gun carriage bearing the coffin draws up to the funeral coach.

In St. George's Chapel

THE members of the Air Council and senior R.A.F. officers who were present at the service in St. George's Chapel, Windsor, included: Lord and Lady De L'Isle and Dudley; Mr. E. N. C. Birch, M.P.; Marshal of the Royal Air Force, Sir John Slessor, and Lady Slessor; Sir James and Lady Barnes; Marshal of the Royal Air Force, Viscount Trenchard, and Viscountess Trenchard; Air Chief Marshals Sir Leslie N. Hollinghurst, Sir Robert M. Brooke-Popham, Sir Edgar R. Ludlow-Hewitt, Sir Philip B. Joubert, Sir Christopher L. Courtney, Sir Douglas C. S. Evill, Sir Guy Garrod, Sir Norman H. Bottomley, Sir W. Alec Coryton, Sir Arthur M. Longmore, and Sir Richard E. C. Peirse; Air Marshals J. MacC. Kilpatrick, C. W. Weedon, and Sir Ralph S. Sorley; Air Vice Marshals W. E. Barnes, S. C. Strafford, A. C. Sanderson, E. B. Addison, A. C. H. Sharp, A. H. Robson, W. E. Theak; A. Cdres. R. B. Lees, R. H. Stanbridge, J. C. Neely, and G. H. Vasse; Air Commandant N. M. Salmon; G/C.s J. M. Birkin, W. H. Kyle, and D. G. Norris; the Rev. F. D. Morley and the Rev. A. S. Giles; Mr. R. H. Melville.

A wreath of Flanders poppies with wings outlined in laurel leaves indicative of the R.A.F. bore the inscription :—"*From the Air Council and Royal Air Force in loyalty and affection.*" Wreaths were also sent by the Royal Auxiliary Air Force, the Royal Air Force Regiment, the Air Training Corps and the Royal Observer Corps.

Mediterranean Exercise

PLANS for a four-power (Britain, United States, France and Italy) naval exercise in the Mediterranean were announced on Friday last from the Naples headquarters of Admiral R. B. Carney, U.S.N., who will direct the exercise on behalf of the four naval commanders-in-chief.

Taking part are the American 6th Fleet, the British Home and Mediterranean Fleets, the French Mediterranean Fleet and the Italian Fleet.

The exercise, code-named "Grand Slam," is designed to increase the ability of Allied naval forces and their air arms normally stationed in the Mediterranean area against any possible aggressor. The presence of the British Home Fleet provides an additional opportunity to test inter-allied communicatons and operational procedures on a large scale. Large segments of the land-based air forces of the four Nations will also participate in this effort to integrate the overall Allied fighting power in the area. More than 20 separate task-units will operate simultaneously throughout the nine-day period with ships

SERVICE AVIATION . . .

and aircraft grouped without regard to nationality. Various combinations of these units will be commanded in turn by Italian, French, British and American admirals.

Two George Medals

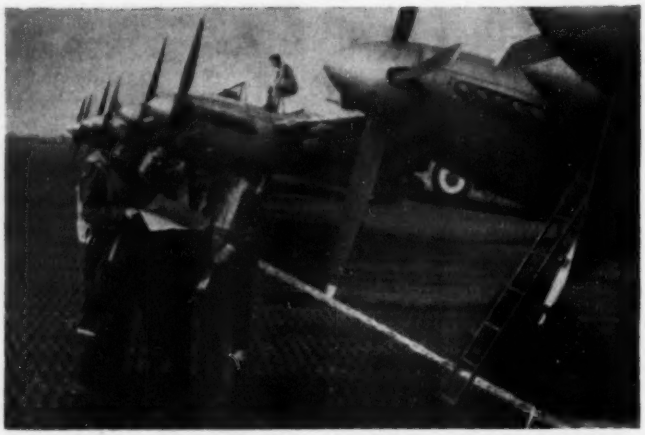
IN recognition of their extreme bravery while attempting the rescue of the crew of a Buckmaster, which had met with an accident just outside R.A.F. Station Benson, F/L. L. C. Newton and L. A/C. R. W. Riseborough have both been awarded the George Medal. In part the citation reads: "Despite the apparent hopelessness of the situation on account of the intense heat to which the members of the crew had been subjected, F/L. Newton and L. A/C. Riseborough persisted in their efforts, notwithstanding that but a slender hope of saving life remained. They displayed great courage and tenacity in the face of personal danger, not only from the original fire which was burning fiercely, but also from the bursting fuel tank which spread the flames over a far wider area in which they themselves were working. Both officer and airmen suffered from severe burns to the hands as a result of their gallant rescue efforts. W/O. S. A. Motte, who pulled one of the Buckmaster's crew to safety, has received the Queen's Commendation for Brave Conduct.

Naval Appointment

THE new Admiral Commanding Reserves is to be Rear-Admiral J. A. S. Eccles, C.B., C.B.E. He will be remembered for the three years, 1943 to 1945, he spent in the carrier H.M.S. *Indomitable*, first in command, as Flag Captain to the Rear-Admiral Aircraft Carriers, Eastern Fleet, and Flag Captain and Flag Officer Commanding the 11th Aircraft Carrier Squadron in the Far East. He was mentioned in despatches for gallantry and skill during operations performed during the capture of Okinawa.

Mountain-rescue Exercise

SIX officers and 14 airmen, drawn from the eight mountain-rescue units in Britain, are undergoing a fortnight's "deep winter" exercise in the Perthshire highlands near Aviemore. Their base is a mountain hut on the Cairngorms, near Loch Morlich. The same party recently attended a rock-climbing course in Wales.



DISPERSAL BRIEFING: Pilots of a Hornet squadron in Malaya discuss the target area before a raid against bandits in the jungle. The unit is stationed at Kuala Lumpur.

Posted to Britain

UNDER the R.A.F. exchange system, G/C. A. B. Greenaway, R.N.Z.A.F., who until recently commanded the Royal New Zealand Air Force station at Wigram, has been posted to the R.A.F. for two years. He will leave for England early in April.

Navy v. R.A.F. at Twickenham

AT Twickenham last Saturday the Navy beat the Air Force 6—0 points, in the first match of the season's Inter-Services Rugby Championship. Conditions were ideal, and it was a lively, open game. The R.A.F. forwards matched the Navy pack and, except in the early stages, got their share of the ball. The Navy outsides, on the other hand, were appreciably stronger than their opponents. The R.A.F. centres, in particular, will need to find altogether more speed and thrust if they are to score against the Army on March 22nd. Stevenson, the R.A.F.'s little scrum half, played pluckily, but for the first half at least was sometimes slow and indecisive with his service. Channer gave a cool and collected display at stand-off, and was responsible for some fine touch-kicking.

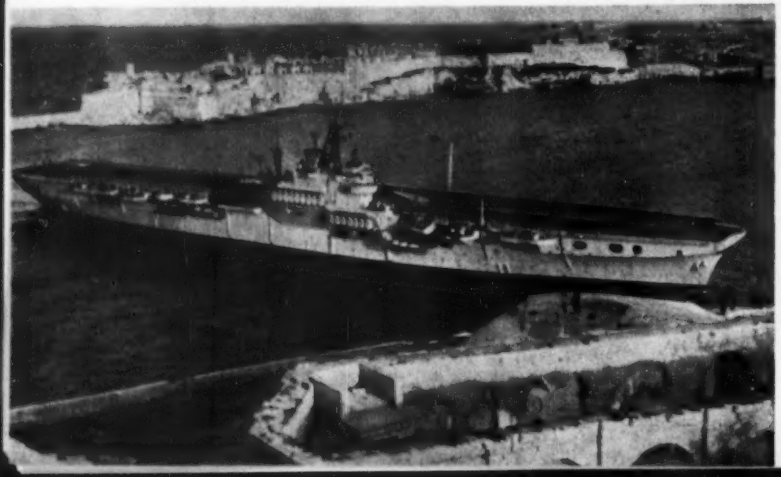
For the Navy, Gray—big and fast—displayed tremendous dash on his wing; from a pass following a fine, straight dash by Ryder, the right centre, he scored a dive-over try on the corner flag to round off quite the most exciting movement of a rather ordinary game. The Navy team played evenly well, and their outsides were quick and sure in defence. The R.A.F. pack staged some good rushes and more than once Greenwood came near to breaking away in the loose. Christie on the left wing was twice rewarded for his fast and determined following-up when he caught Fenner, the Navy full back, in possession. On the whole, the Navy team looked as if they could do better still. The teams were:—

Royal Air Force.—*Full back:* S/L. A. A. Smailes (Middleton St. George); *Three-quarters:* A/C. G. M. Griffiths (Upwood); L. A/C. J. H. Daniels (Innsworth); L. A/C. A. L. Stalder (Halton); P/O. A. M. Christie (Valley): *Half-backs:* F/O. M. R. Channer (Syerston); L. A/C. J. M. Stevenson (West Kirby); *Forwards:* F/O. P. O'K. Plumpton (South Cerney); F/O. A. H. Rennie (Horsham St. Faith); F/L. R. V. Stirling* (Cranwell); P/O. R. H. Williams (Yatesbury); F/L. P. G. Yarranton (A.M.); F/O. P. S. Collingridge (Cranwell); S/L. R. H. G. Weighill* (Capt.) (Staff Coll.); A/C. J. Greenwood* (Middle Wallop).

Royal Navy.—*Full back:* Lt. F. N. Fenner; *Three-quarters:* Lt. (E) R. J. Horlick; Lt. R. M. Holgate, R.M.; Ldg. Sig. F. J. Ryder; Surg. Lt. (D) B. M. Gray; *Half-backs:* Instr. Lt. R. A. Slater; Instr. Sub-Lt. H. P. Jones; *Forwards:* Lt. Cdr. (E) P. B. Sindery; Instr. Lt. D. B. Vaughan*, Lt. D. P. W. Kelly; Lt. D. T. Wilkins* (Capt.); Air Art. J. Jenkins; Stoker W. O. Williams*; Elec. Art. J. McQuade; Lt. (E) J. D. Graham.

* Internationals.

IN THE GRAND HARBOUR: H.M.S. "Theseus" appears nearly to fill the entrance as she enters the Grand Harbour at Valetta, Malta, G.C. Her squadrons, No. 802 and No. 825, are to transfer to "Ocean" for Korea and she will take "Ocean's" place in the Mediterranean Fleet.



New Zealand N.S. Training

TRAINING courses for 18-year-old entrants of the Royal New Zealand Air Force have now been extended to five stations. The new stations are Whenupai, Wigram and Ohakea; previously only Taieri and Hobsonville were used.

R.O.C. Recruiting

TO aid local recruiting for the Royal Observer Corps, A. Cdre. G. H. Vasse, C.B.E., the Commandant, held a reception on February 14th at the Bedford headquarters, where No. 12 Group were "At Home" to a number of local dignitaries. Later a display of operational procedure was staged in the group operations room.

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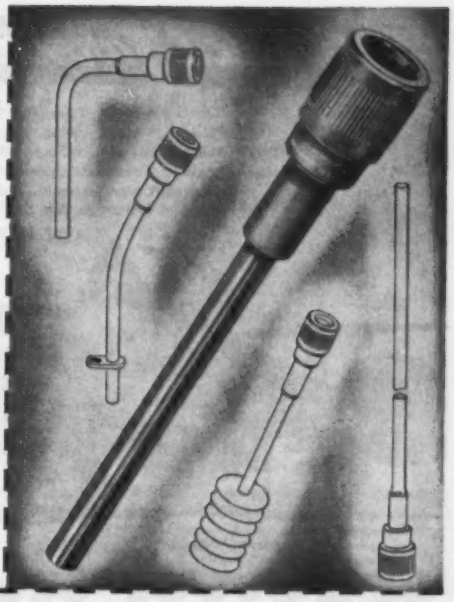

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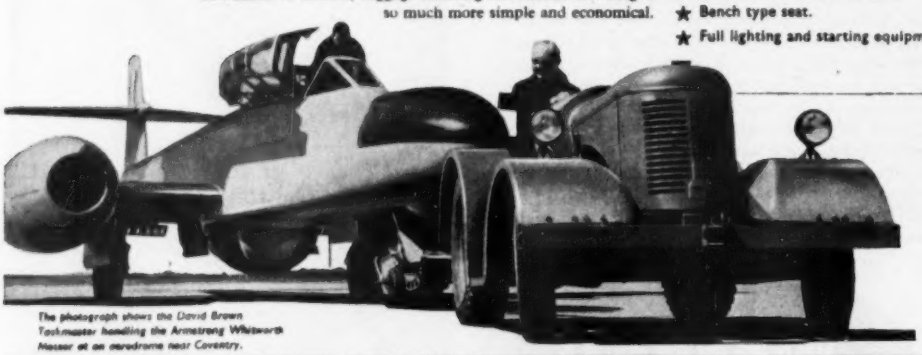

The photograph shows the David Brown Taskmaster handling the Armstrong Whitworth Hassar at an aerodrome near Coventry.

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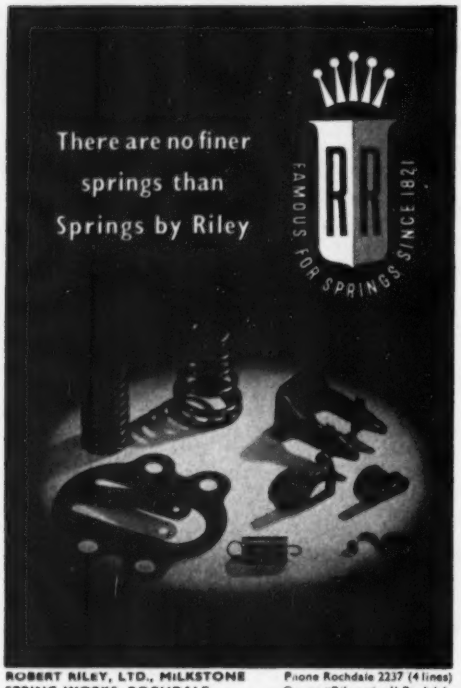

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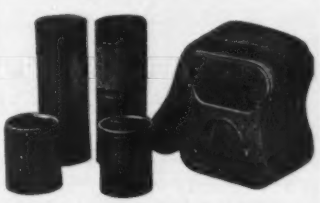

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(3) ASSISTANT CHIEF FOR JIG AND TOOL DESIGN DEPARTMENT. Experience of aero engine and aircraft manufacture desirable, but not essential.—Box F.789.

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VICKERS-ARMSTRONGS, Ltd. (Aircraft Section), have vacancies for the following staff:— AIRCRAFT STRESSMEN, JIG AND TOOL DRAUGHTSMEN (aircraft experience preferable, but not essential). APPLY in writing to the Employment Manager, Vickers-Armstrongs, Ltd. (Aircraft Section), Weybridge, Surrey. [7736

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WHEN forwarding invoice, please quote Ref. No. 52/3. [7720

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DEVELOPMENT engineers with experience on problems involving thermodynamic and mechanical considerations, for work on aircraft heating installations.—Write, stating details of age, training and experience, to Box 6725. [7697

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TECHNICAL authors required for compilation of spares parts catalogues. Ex-R.A.F. or Fleet Air Arm personnel with maintenance experience an advantage.—Apply, giving full details of experience, to Personnel Manager, de Havilland Aircraft Co., Hatfield. [7730

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JUNIOR draughtsman required, S.E. London area, with experience of design and development of aircraft instrument mechanism.—Applications should write, stating age and salary expected, with details of experience, to Box 7,849 at 191, Gresham House, E.C.2. [7094]

SENIOR designer draughtsman required, S.E. London area, with experience of design and development of aircraft instrument mechanism.—Applicants should write, stating age and salary expected, with details of experience, to Box 7,848 at 191, Gresham House, E.C.2. [7095]

JUNIOR aerodynamicists, required. Preferably with Higher National Certificate and with some previous experience in similar capacity.—Applications, in writing, to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Beds., stating age, experience and salary required. [0601]

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H. M. HOBSON, Ltd., invite applications for positions in the drawing office as follows: designers, detail and modification draughtsmen, checkers, stressmen. The work is concerned with interesting projects connected with fuel metering equipment and hydraulic flying controls for aircraft.—Hobson Works, Fordhouses, Wolverhampton. [0630]

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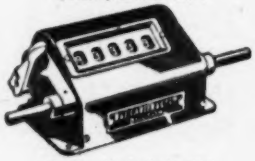

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